CHAPTER IV

INDIVIDUAL TYPHOONS OF 1961

A. TYPHOON TESS (240000Z-310600Z MARCH 1961)

On 21 and 22 March, the winds aloft and surface observations at Truk indicated that a weak tropical cyclone, which originated about 160 mi SE of Ponape on 18 March, had passed just S of Truk at about 211200Z and was intensifying. A reconnaissance aircraft investigated the cyclone on 23 March and reported that a weak circulation existed with maximum surface winds of 15 kts. The circulation was closely observed and on 24 March a reconnaissance aircraft indicated that the system was intensifying, for the maximum observed surface winds had increased to 45 kts. Based on this data, the first warning was issued at 240000Z on Tropical Storm TESS.

At 240000Z TESS was about 300 mi S of Guam, moving towards Yap and intensifying. TESS was upgraded to typhoon intensity at 250000Z and by 251200Z was just S of Yap with maximum surface winds of 75 kts. TESS passed within 30 mi of Yap, and reports from Yap indicated a minimum sea level pressure of 989.0 mbs with peak surface gusts of 50 kts. After passing Yap, TESS began to recurve, and by 271200Z was moving just E of N at 4 kts. By this time TESS had maximum surface winds of 125 kts and no further intensification was anticipated as TESS appeared to be in a trough that was moving through the westerlies; however, the trough passed quickly to the E and at 280600Z TESS began to intensify again and turn towards the NNW. Surface winds reached 135 kts by 281800Z and thereafter TESS began to weaken slowly. After 300600Z TESS began to recurve and rapidly weaken. By 310600Z TESS was moving ENE at 23 kts with maximum surface winds of less than 30 kts, therefore the final warning was issued at this time.

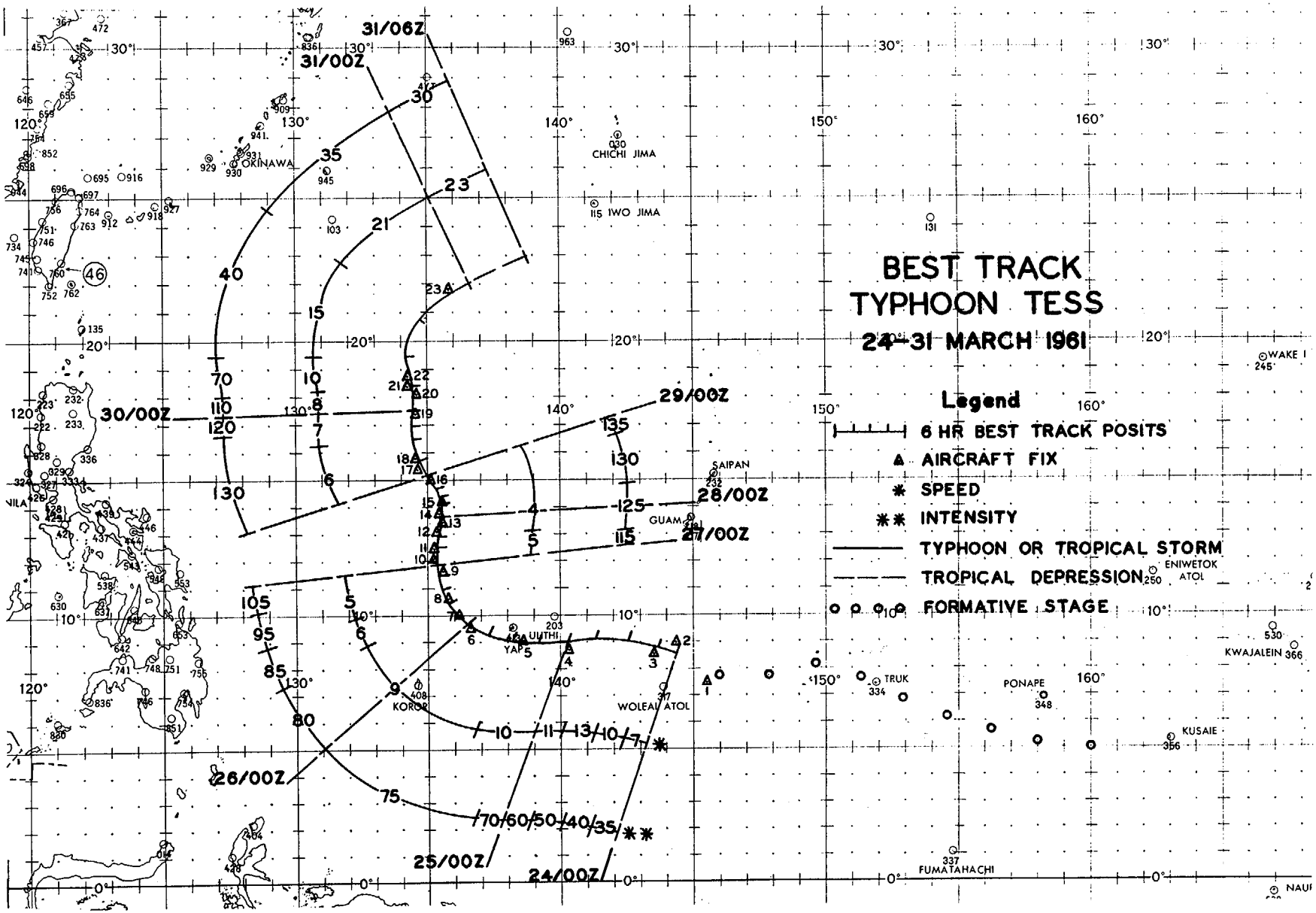
The cyclonic circulation of TESS extended to about the 300 mb level during the period it was a typhoon and at the time of the final warning extended to less than 10,000 ft. TESS followed the track of climatology quite well, and in a period of 7 days and 6 hours traveled 1,450 mi, averaging 8 kts or 200 mi per day. The minimum speed of movement was 4 kts on 27 and 28 March and the maximum speed of movement was 23 kts on 31 March.

An unusual feature of TESS was that on 28 March it appeared that TESS was caught in a trough moving through the westerlies. Weakening was indicated and TESS had begun to move E of N; however, with passage of the trough to the E, TESS began to intensify again and turned to the NNW. Another rarity, TESS was one of 3 typhoons to occur during March in the past 14 years.

A concentric eye was observed by weather reconnaissance at 270740Z at 12.6N 135.2E. The SLP was 940 mb; 700 mb wind, 120 kts; height, 8500 ft; and temperature 21° C.

TESS, beating the season by about four months began her life

CHURNING HARMLESSLY IN THE OPEN SEA OF THE CAROLINE ISLANDS. SHE MAINTAINED A RELATIVE WESTERLY MOVEMENT PASSING 24 MILES SOUTH OF YAP ISLAND ON THE 25TH OF MARCH AT 1200Z. MAXIMUM PEAK GUSTS OF 50 KTS WERE RECORDED AT 2255Z. A TOTAL OF 3.6 INCHES OF RAIN FELL DURING THE PASSAGE, WITH NO RISE IN TIDES. PRELIMINARY REPORTS INDICATED CONSIDERABLE DAMAGE TO TREES AND HOUSING WITH NO CASUALTIES REPORTED. TESS BEGAN RECURVING TO THE NORTH SHORTLY AFTER PASSAGE OF YAP. SHE REMAINED ON THIS NORTHERLY COURSE BLOWING INNOXIOUSLY OVER OPEN SEA FOR THE DURATION OF HER LIFE, BUT MAY HAVE CAUSED DAMAGE TO SEAGOING VESSELS.


BEST TRACK
TYPHOON TESS
24-31 MARCH 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
31/06Z
31/00Z
30/00Z
29/00Z
28/00Z
27/00Z
26/00Z
25/00Z
24/00Z
70/60/50/40/35
CHICHI JIMA
IWO JIMA
OKINAWA
SAIPAN
GUAM
YAP
ULITHI
KOROR
WOLEAI ATOL
ENIWETOK ATOL
TRUK
PONAPE
KUSAIE
KWAJALEIN
WAKE I
FUMATAHACHI

LAND RADAR AND AIRCRAFT FIXES - TYPHOON TESS

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
1	222300Z	07.6N	145.5E	56-P-10	15	---	10240	1009	09/09	SEMICIRC WALL CLDS W THRU N-E DIA APPROX 40 MI
2	232300Z	09.0N	144.3E	56-P-10	45	30	10220	1005	12/11	SEMICIRC DIA 30 MI WALL CLDS N & W OPEN E & S
3	240636Z	08.7N	143.6E	56-P-02	30	35	10121	1003	13/03	NOT WELL DEFINED ON RADAR
4	242227Z	08.8N	140.2E	56-P-05	65	40	9870	994	17/13	NOT WELL DEFINED 10 MI DIA
5	250715Z	09.1N	138.7E	56-P-01	75	70	9850	984	16/11	CIRC DIA 40 MI WALL CLDS E-N-W
6	252145Z	09.7N	136.6E	56-P-05	80	60	9500	988	15/08	NO WELL DEFINED EYE PATTERN
7	260230Z	10.0N	136.2E	56-P-05	80	60	9410	980	17/11	NO WELL DEFINED EYE PATTERN
8	260745Z	10.6N	135.9E	56-P-02	80	60	9490	974	17/10	CIRC NOT TOO WELL DEFINED DIA 70 MI WALL CLDS N-NE
9	262200Z	11.8N	135.5E	56-P-05	50	90	8930	966	17/13	CIRC DIA 20 MI WELL DEFINED
10	270300Z	12.2N	135.3E	56-P-02	110	110	8760	968	21/14	CIRC DIA 20 MI WELL DEFINED
11	270740Z	12.6N	135.2E	56-P-02	110	120	8510	940	21/07	CIRC DIA 20 MI
12	271500Z	13.1N	135.3E	VW1-R-05	---	---	----	---	-----	DIA 12 MI HVY WALL CLDS ALL QUADS
13	272145	13.5N	135.7E	56-P-05	---	105	8680	974	17/17	ELLIP DIA 12 BY 25 MI NE-SW EYE NOT WELL DEFINED
14	280245Z	13.9N	135.5E	56-P-05	80	120	8610	972	16/16	EYE NOT DEFINED BY RADAR OR VISUAL
15	280920Z	14.1N	135.6E	56-P-02	100	120	8510	946	18/17	30 MI DIA WELL DEFINED WALL CLDS ALL QUADS

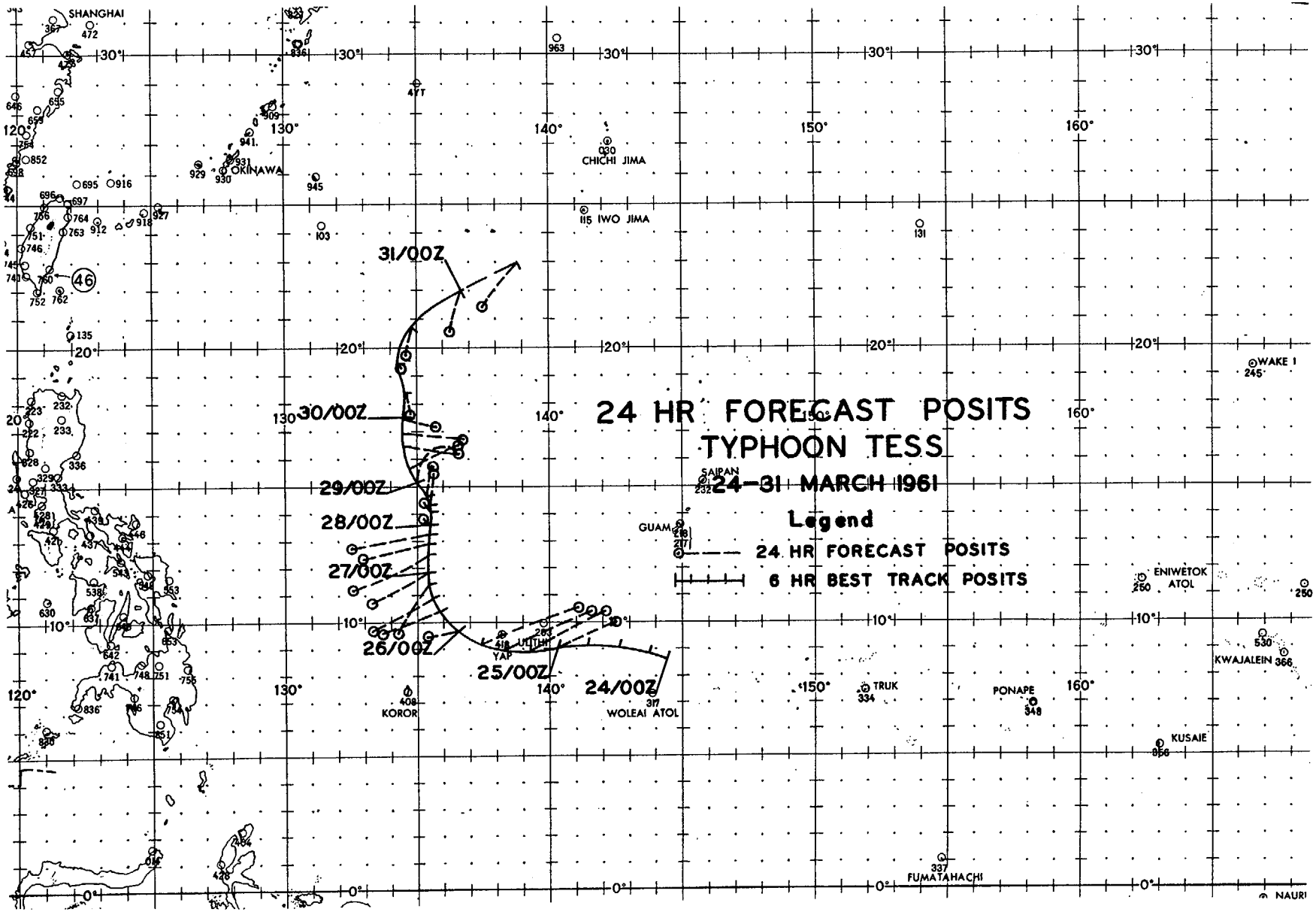
LAND RADAR AND AIRCRAFT FIXES - TYPHOON TESS (CONT'D)

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
16	282215Z	15.0N	135.1E	56-P-05	---	122	8420	937	20/16	CIRC DIA 15MI WALL CLDS ALL QUADS
17	290245Z	15.4N	134.8E	56-P-05	100	105	8610	946	19/15	CIRC DIA 20MI WALL CLDS ALL QUADS
18	290745Z	15.9N	134.6E	56-P-05	110	120	8780	951	21/17	CIRC DIA 15MI WALL CLDS ALL QUADS
19	292210Z	17.4N	134.6E	56-P-05	125	110	9020	953	19/14	30X20MI LONG AXIS NW OPEN SE
20	300356Z	18.2N	134.6E	56-P-05	120	100	9140	975	21/15	NOT DEFINED WALL CLDS NE ALL OTHER QUADS OPEN
21	300535Z	18.6N	134.3E	VW1-R-05	---	---	-----	---	-----	CIRC DIA 18MI OPEN SW
22	300755Z	18.8N	134.3E	56-P-10	80	60	9930	987	21/16	EYE NOT DEFINED
23	302230Z	21.8N	135.9E	56-P-10	---	40	10380	1009	10/08	CIRC DIA 40MI OPEN SW-N

TYPHOON TESS 24-31 MARCH 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG. DISTANCE	48 HR. ERROR DEG. DISTANCE
240000Z	08.6N	144.3E	-------	-------
240600Z	08.9N	143.6E	-------	-------
241200Z	09.1N	142.6E	-------	-------
241800Z	09.1N	141.3E	-------	-------
250000Z	09.0N	140.1E	065-146	-------
250600Z	09.0N	139.1E	065-185	-------
251200Z	09.0N	138.1E	070-210	-------
251800Z	09.2N	137.2E	070-235	-------
260000Z	09.7N	136.5E	246-74	072-265
260600Z	10.4N	135.9E	251-140	078-272
261200Z	11.0N	135.7E	238-162	086-247
261800Z	11.5N	135.5E	212-140	086-230
270000Z	12.0N	135.4E	246-148	250-303
270600Z	12.5N	135.4E	243-177	249-350
271200Z	12.9N	135.3E	256-141	250-391
271800Z	13.3N	135.4E	260-174	238-352
280000Z	13.7N	135.5E	275-84	252-389
280600Z	14.1N	135.5E	325-26	250-355
281200Z	14.5N	135.4E	360-55	263-240
281800Z	14.8N	135.2E	018-63	268-252
290000Z	15.2N	135.0E	058-105	030-118
290600Z	15.7N	134.7E	073-117	042-188
291200Z	16.3N	134.5E	096-116	050-292
291800Z	17.0N	134.5E	104-127	058-360
300000Z	17.7N	134.6E	118-71	062-435
300600Z	18.5N	134.4E	159-61	068-430
301200Z	19.5N	134.1E	153-23	078-407
301800Z	20.8N	134.6E	186-59	087-382
310000Z	22.1N	136.4E	188-88	139-118
310600Z	23.0N	138.8E	221-110	228-162

AVERAGE 24 HOUR ERROR 117 MI
AVERAGE 48 HOUR ERROR 297 MI


24 HR FORECAST POSITS
TYPHOON TESS
24-31 MARCH 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
31/00Z
30/00Z
29/00Z
28/00Z
27/00Z
26/00Z
25/00Z
24/00Z
SHANGHAI
OKINAWA
CHICHI JIMA
IWO JIMA
GUAM
SAIPAN
YAP
KOROR
WOLEAI ATOL
TRUK
PONAPE
KUSAIE
ENIWETOK ATOL
KWAJALEIN
WAKE I
FUMATAHACHI
NAURU

B. TYPHOON ALICE (170000Z-211200Z MAY 1961)

A VERY WEAK EASTERLY WAVE APPEARED TO HAVE PASSED GUAM AT 081200Z, PROVIDING A SLIGHT WIND SHIFT AND SHOWERS ALONG ITS TRACK. IT WAS ONE OF MANY TO TRAVEL THIS ROUTE AND HAD LITTLE APPARENT SIGNIFICANCE. BY THE TIME IT WAS 110 MI S OF MANILA AT 150600Z A CLOSED CIRCULATION EXISTED, THOUGH SOMEWHAT CONFUSED IN FORM, AND STILL AROUSED NO SUSPICION. BY 170000Z, HOWEVER, THE ASSOCIATED WIND PATTERN WAS SUFFICIENT TO WARRANT ISSUE OF A DEPRESSION WARNING. RECONNAISSANCE AT 170345Z INDICATED WINDS OF 35 KTS AT THE SURFACE, AND AN INDICATED SURFACE PRESSURE OF 988.0 MB. INTENSIFICATION OF TROPICAL DEPRESSION SIX TO TYPHOON STRENGTH WAS RAPID, OCCURRING BETWEEN 170000Z AND 171800Z.

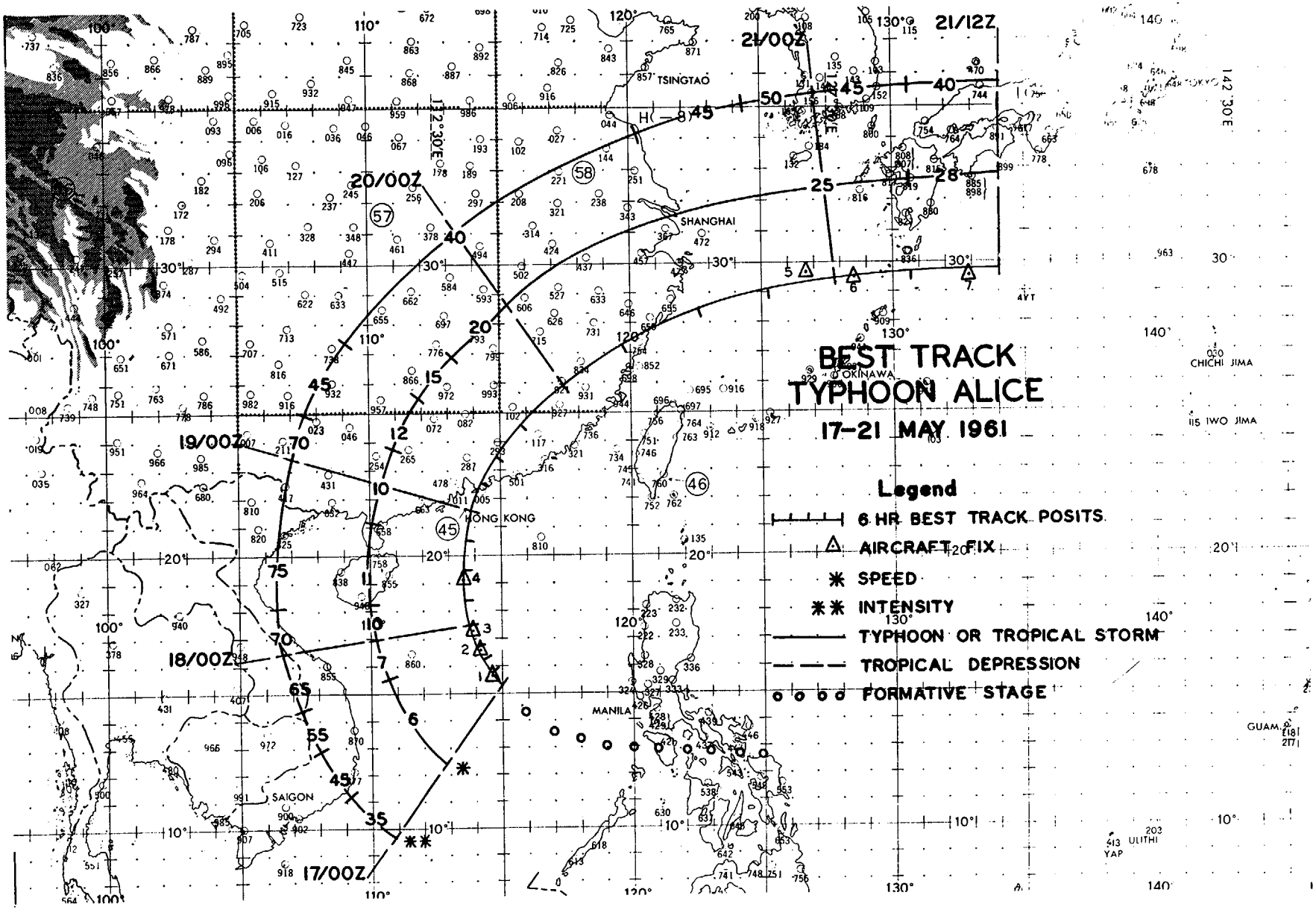
ALICE MOVED NORTHWARD TOWARD HONG KONG, AND INTENSIFIED TO A CIRCULATION WITH 75 KT SFC WINDS BY 180600Z. THE TYPHOON PASSED WITHIN 10 OR 15 MI TO THE W OF THE ROYAL OBSERVATORY AT HONG KONG AT 190500Z. AN UPPER WIND OBSERVATION MADE BY THE OBSERVATORY AT 190400Z, WHEN THE TYPHOON WAS A FEW MILES SW OF THE STATION, INDICATES THE CYCLONE TO HAVE EXTENDED THROUGH 40000 FT AS A CLOSED CIRCULATION.

ALICE DEPARTED THE ASIATIC MAINLAND AT 200800Z, AND WAS 105 MI S OF KAGOSHIMA, KYUSHU, JAPAN AT 210600Z. THE FINAL WARNING WAS ISSUED AT 211200Z WHEN ALICE WAS MOVING E AT 28 KTS. IT WAS IN ITS FINAL STAGES AS A TROPICAL CIRCULATION, RAPIDLY BECOMING EXTRATROPICAL.

WHILE IN THE SOUTH CHINA SEA, ALICE FOLLOWED A SMOOTH TRACK OF RECURVATURE AROUND THE WESTERN SIDE OF THE PACIFIC HIGH, THEN IT MOVED INTO THE WESTERLIES WHILE OVER THE ASIATIC MAINLAND.

ALICE TRAVELED 1660 MI IN 4 AND ONE HALF DAYS AT AN AVERAGE SPEED OF 15.4 KTS OR 368 MI PER DAY. THE CYCLONE MOVED AT A MINIMUM SPEED OF 6 KTS FROM 170000Z TO 171800Z AND AT A MAXIMUM SPEED OF 28 KTS FROM 210600Z TO 211200Z. TYPHOON ALICE WAS AT ITS GREATEST INTENSITY (75 KTS) FROM 180600Z TO 190000Z.

THE AREAS AFFECTED BY ALICE WERE THE SOUTH CHINA SEA, HONG KONG, AND THE ASIATIC MAINLAND. WHILE ALICE WAS IN THE SOUTH CHINA SEA, A PHILIPPINE FISHING VESSEL, DE LA PAZ, WAS SUNK AS A RESULT OF THE HIGH WINDS AND SEAS CREATED BY THE TROPICAL CYCLONE. HONG KONG SUFFERED 4 DEAD AND 20 INJURED; HEAVY RAINS AND STRONG WINDS DESTROYED CROPS ON 321,000 ACRES OF LAND OF THE CHEKIANG PROVINCE ON THE ASIATIC MAINLAND.


BEST TRACK
TYPHOON ALICE
17–21 MAY 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
21/12Z
21/00Z
20/00Z
19/00Z
18/00Z
17/00Z
TSINGTAO
SHANGHAI
HONG KONG
MANILA
SAIGON
OKINAWA
CHICHI JIMA
IWO JIMA
GUAM
YAP
ULITHI
142.30°E
132.30°E

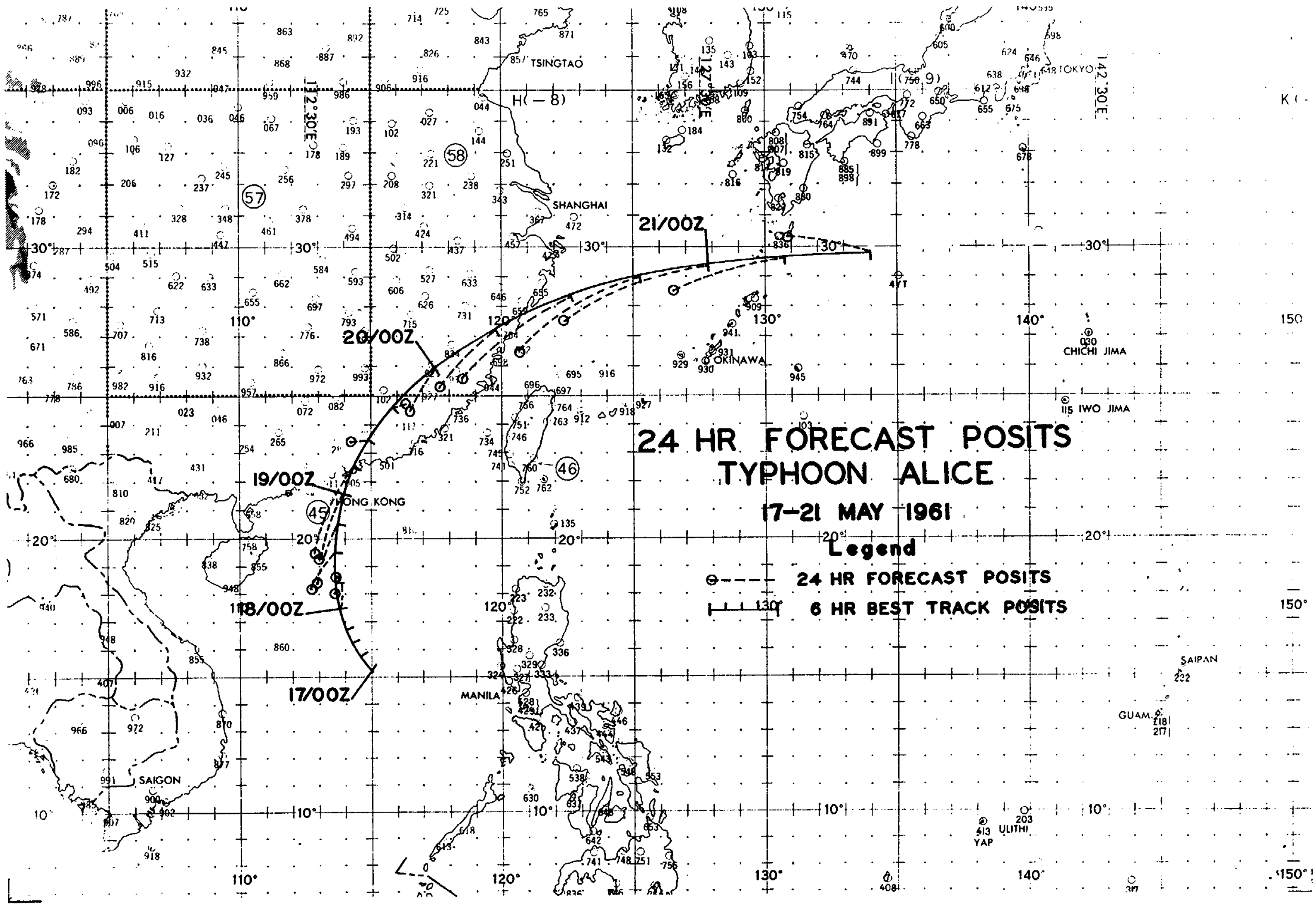
LAND RADAR AND AIRCRAFT FIXES - TYPHOON ALICE

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/Td (°C)	EYE CHARACTERISTICS
1	170345Z	15.5N	114.8E	56-P-02	35	25	9920	988	14/09	CIRC DIA 50 MI WALL CLDS E & N
2	172130Z	16.8N	114.2E	VW1-U-U	---	---	----	---	-----	----------
3	172230Z	17.2N	114.0E	56-P-02	65	60	9730	985	13/09	CIRC DIA 30 MI WALL CLDS OPEN W
4	181000Z	19.1N	113.7E	VW1-R-10	---	---	----	---	-----	EYE WELL DEFINED DIA 38 MI
5	202230Z	29.8N	126.9E	56-P-05	---	50	9860	997	08/08	EYE NOT DEFINED
6	210300Z	29.6N	128.6E	56-P-02	---	45	----	---	-----	EYE NOT DEFINED NO WALL CLDS
7	210910Z	29.7N	133.0E	56-P-05	35	60	9930	998	10/09	DIFFUSE OPEN S & W

TYPHOON ALICE 17-21 MAY 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG. DISTANCE	48 HR. ERROR DEG. DISTANCE
170000Z	15.2N	115.0E	-------	-------
170600Z	15.7N	114.7E	-------	-------
171200Z	16.2N	114.4E	-------	-------
171800Z	16.7N	114.2E	-------	-------
180000Z	17.3N	114.0E		-------
180600Z	18.3N	113.8E	195-23	-------
181200Z	19.5N	113.7E	209-94	-------
181800Z	20.5N	113.8E	200-140	-------
190000Z	21.6N	113.9E	200-151	-------
190600Z	22.5N	114.1E	201-200	186-157
191200Z	23.6N	114.8E	244-38	213-286
191800Z	24.7N	115.8E	070-27	213-385
200000Z	25.9N	117.5E	212-103	219-440
200600Z	27.3N	119.9E	232-165	226-576
201200Z	28.3N	122.5E	233-267	233-258
201800Z	29.2N	125.2E	235-288	229-218
210000Z	29.6N	128.0E	247-330	242-443
210600Z	29.8N	130.8E	253-237	250-463
211200Z	29.8N	134.1E	277-168	256-557

AVERAGE 24 HOUR ERROR 159 MI
AVERAGE 48 HOUR ERROR 378 MI


24 HR FORECAST POSITS
TYPHOON ALICE
17-21 MAY 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
17/00Z
118/00Z
19/00Z
20/00Z
21/00Z
HONG KONG
SHANGHAI
TSINGTAO
TOKYO
OKINAWA
MANILA
SAIGON
CHICHI JIMA
IWO JIMA
SAIPAN
GUAM
ULITHI
YAP
H(-8)
122°30'E
127°30'E
142°30'E

C. TYPHOON BETTY (220600Z-281200Z MAY 1961)

THE ORIGIN OF TYPHOON BETTY, UNLIKE MANY OTHER TROPICAL CYCLONES, CANNOT BE TRACED EASTWARD IN TERMS OF STATION PASSAGE TO ITS INCEPTION AS A CLOSED VORTEX. AVAILABLE DATA INDICATES THAT BETTY BECAME A CLOSED VORTEX BEFORE 201200Z S OF KOROR. THE 24 HOUR PRESSURE TENDENCY FALLS FROM MAJURO TO KOROR THAT FREQUENTLY PRECEDE THE DEVELOPMENT OF STRONG TROPICAL CYCLONES COMMENCED AT ABOUT 180600Z. THESE FALLS CEASED AT MAJURO AFTER 190600Z, AFTER 210900Z AT GUAM AND AFTER 211200Z AT KOROR. THE 201200Z SURFACE STREAMLINE CHART INDICATED A VORTEX BETWEEN KOROR AND THE EQUATOR WHICH MOVED SLOWLY NW AND PASSED KOROR AFTER 201200Z. PRIOR TO 201200Z ONLY AN E-W ELONGATED PRESSURE TROUGH EXISTED N OF THE EQUATOR FROM W OF KOROR TO KUSAI.

RECONNAISSANCE INTO THE CIRCULATION PROVIDED DATA TO ISSUE A TROPICAL STORM WARNING AT 220600Z, INDICATING 60 KT SURFACE WINDS NEAR THE CENTER. THE FIRST TYPHOON WARNING WAS ISSUED AT 221200Z.

AFTER THE FIRST WARNING BETTY MOVED NW TOWARD TAIWAN AT AN AVERAGE SPEED OF 10 KTS WITH THE RATE OF INTENSIFICATION OF SURFACE WINDS AVERAGING 5 KTS PER 6 HOURS. PEAK INTENSITY OF 130 KTS WAS REACHED AT 251200Z. THE TYPHOON PASSED LESS THAN 10 MI WSW OF BATAN ISLAND, ABOUT 120 MI N OF LUZON, JUST AFTER 252100Z. AT THIS TIME THE SURFACE WIND SPEEDS OF THE CIRCULATION WERE 125 KTS. THE HIGHEST REPORTED WINDS BY OBSERVATION AT BATAN WERE 100 KTS AT 251900Z. THE ANEMOMETER WAS CARRIED AWAY SHORTLY THEREAFTER. THE MINIMUM PRESSURE BY OBSERVATION WAS 957.5 MB AT 252100Z, JUST BEFORE THE CENTER OF THE EYE PASSED BATAN. AIRCRAFT RECONNAISSANCE AT 252320Z INDICATED THE MINIMUM PRESSURE TO BE 950 MB IN THE CENTER OF BETTY, WHICH WAS LESS THAN 20 MI FROM BATAN AT THAT TIME. THE TYPHOON "LANDED" ABOUT MIDWAY OF THE E COAST OF TAIWAN AT 261600Z WITH WIND SPEEDS OF 90 KTS. IT MOVED ACROSS THE ISLAND IN A NNW DIRECTION AT AN AVERAGE SPEED OF 18 KTS. THE LAND MASS EFFECTIVELY DESTROYED THE EYE OF THE TYPHOON AS SUCH, AND REDUCED THE MAXIMUM SURFACE WINDS AROUND BETTY TO 60 KTS. BETTY MOVED IN AN EASTERLY DIRECTION FOR THE FIRST TIME JUST AFTER 270000Z. THE STORM SKIRTED THE ASIATIC MAINLAND UNTIL IT REACHED 32N THEN VEERED SHARPLY NE AND MOVED INTO KOREA JUST N OF CHEJU-DO AT 280800Z. THE LAST WARNING WAS ISSUED AT 281200Z AS IT WAS RAPIDLY BECOMING EXTRATROPICAL. SHORTLY THEREAFTER IT BECAME IMBEDDED AT THE SURFACE IN A RAPIDLY INTENSIFYING EXTRATROPICAL CYCLONE AND LOST ITS IDENTITY.

THE PATH FORMED BY THE MOVEMENT OF BETTY IS FAIRLY TYPICAL OF THE TRACK CREATED AS A RESULT OF THE RIDGE LINE MOVING N DURING THE LIFE CYCLE OF A TYPHOON. THE 500 MB RIDGE MOVED FROM 20N AT 221200Z TO 24N AT 241200Z. A TRANSIENT ANTICYCLONE FORMED JUST WNW OF SHANGHAI ON 25 MAY, CREATING THE EFFECT OF FURTHER NORTHWARD MOVEMENT OF THE RIDGE LINE. THESE FACTORS TENDED TO CAUSE THE CONTINUED NORTHERLY MOVEMENT OF BETTY RATHER THAN RECURVATURE AT 18 TO 20 DEGREES N AS MIGHT HAVE BEEN EXPECTED OTHERWISE. AFTER THE TRANSIENT ANTICYCLONE MOVED EASTWARD OVER JAPAN, BETTY CURVED SHARPLY BEHIND IT AND MOVED TO THE NE.

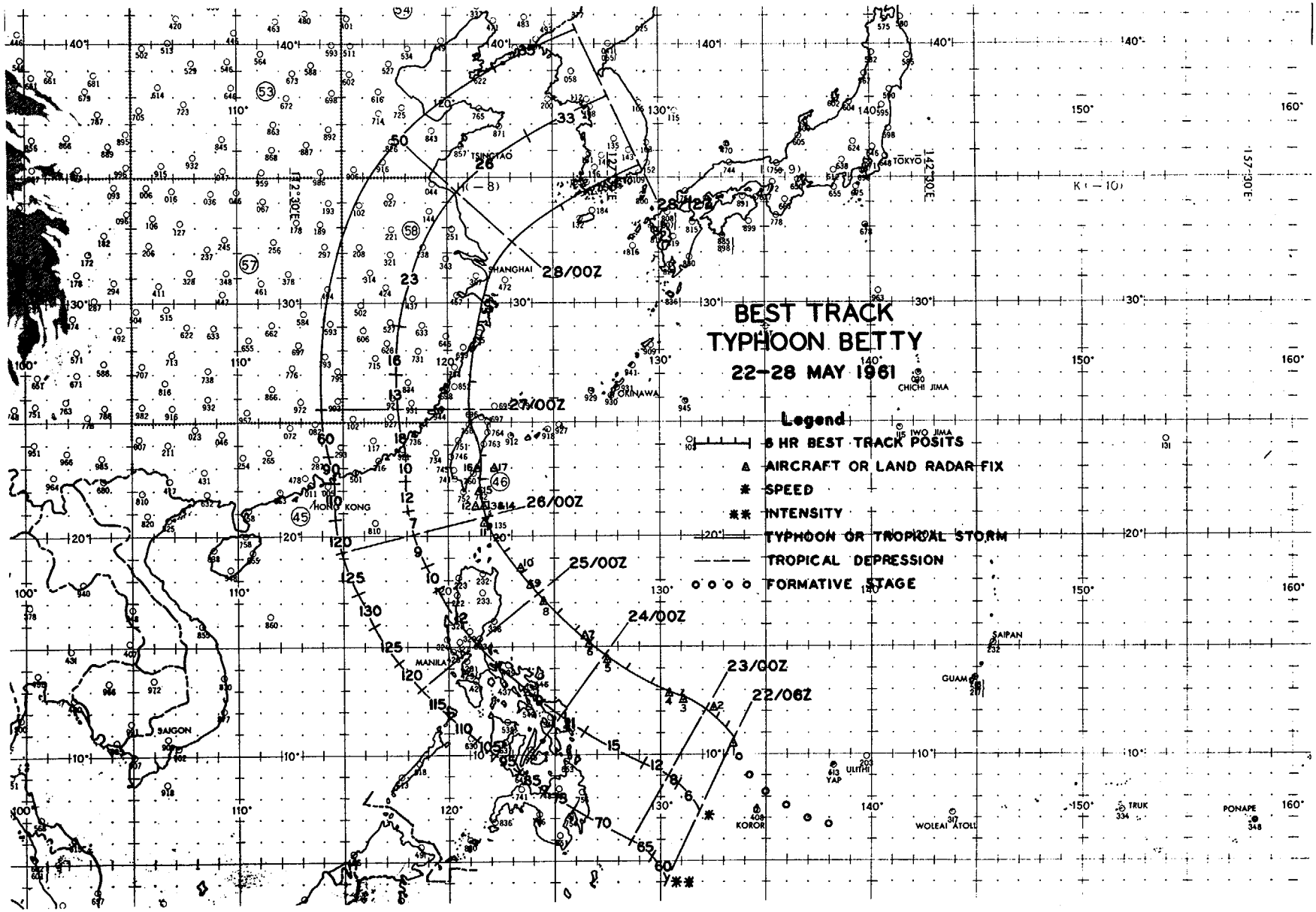
TYPHOON BETTY EXTENDED THOUGH THE 200 MB LEVEL AT 261200Z WHILE NEAR TAIWAN.

EACH YEAR ONE OR TWO UNUSUAL REPORTS OF CONCENTRIC EYES ARE MADE BY THE RECONNAISSANCE OBSERVERS. ONE REPORT WAS MADE ON TYPHOON BETTY AT 230500Z, THE TIME OF THE THIRD RECONNAISSANCE FIX AND IS QUOTED HERE: "VULTURE 0311 BETTY SIX EYE DATA REPORT PSN ONE TWO PT SIX NORTH AT ONE THREE ONE PT ONE EAST AT ZERO FIVE ZERO ZERO ZULU BASIS FOR FIX WIND CENTER FIX BY PENETRATION PSN BY LORAN ACCY 8 MI MAX OBSVD WNDS SFC 75K EAST QUAD MAX FLT LVL WND 55K EAST QUAD 700MB HT 9880FT XMTD SLP 984 MBS FLT LVL 673MB TEMP 11.5 DEGC DEW PT 2 DEGC TURB LIGHT ALL QUAD EYE WITHIN AN EYE DIA CIRCULAR DIA OF OUTER EYE 60 MILES DIA OF INNER EYE 20 MILES SC CLDS IN INNER EYE MOD RAIN ALL QUAD."

THERE ARE SOME INDICATIONS THAT THE WALL CLOUD SURROUNDING THE EYE OF A WELL DEVELOPED TYPHOON IS DETACHED FROM THE SPIRAL BANDS ASSOCIATED WITH THE TYPHOON, IF RADAR PICTURES MAY BE CONSIDERED EVIDENCE. THE POSSIBILITY THEN EXISTS THAT A SPIRAL BAND MAY COMPLETELY SURROUND THE WALL CLOUD FOR SHORT PERIODS OF TIME, THUS FORMING WHAT APPEARS TO BE THE OUTER CIRCULAR CLOUD PATTERN ASSOCIATED WITH THE PHENOMENA KNOWN AS A CONCENTRIC EYE.

TYPHOON BETTY TRAVELED 2025 MI IN THE 6 DAYS 6 HOURS THAT WARNINGS WERE ISSUED, AT AN AVERAGE SPEED OF 13.5 KTS. THE MINIMUM SPEED OF MOVEMENT, 6 KTS OCCURRED BETWEEN 220600Z AND 221800Z. THE MAXIMUM SPEED OF MOVEMENT, 33 KTS, OCCURRED BETWEEN 280600Z AND 281200Z. THE MAXIMUM SURFACE WIND SPEED OF 130 KTS OCCURRED BETWEEN 251200Z AND 251800Z.

THE AREAS AFFECTED BY BETTY WERE BATAN ISLAND, TAIWAN, THE ASIATIC MAINLAND JUST S OF SHANGHAI, AND KOREA. THE ONLY REPORTS AVAILABLE INDICATE EXTENSIVE CROP DAMAGE ON TAIWAN DUE TO FLOODING.


BEST TRACK
TYPHOON BETTY
22-28 MAY 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT OR LAND RADAR FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
28/00Z
27/00Z
26/00Z
25/00Z
24/00Z
23/00Z
22/06Z
TSINGTAO
SHANGHAI
HONG KONG
MANILA
SAIGON
OKINAWA
TOKYO
CHICHI JIMA
IWO JIMA
SAIPAN
GUAM
YAP
ULITHI
KOROR
WOLEAI ATOLL
TRUK
PONAPE

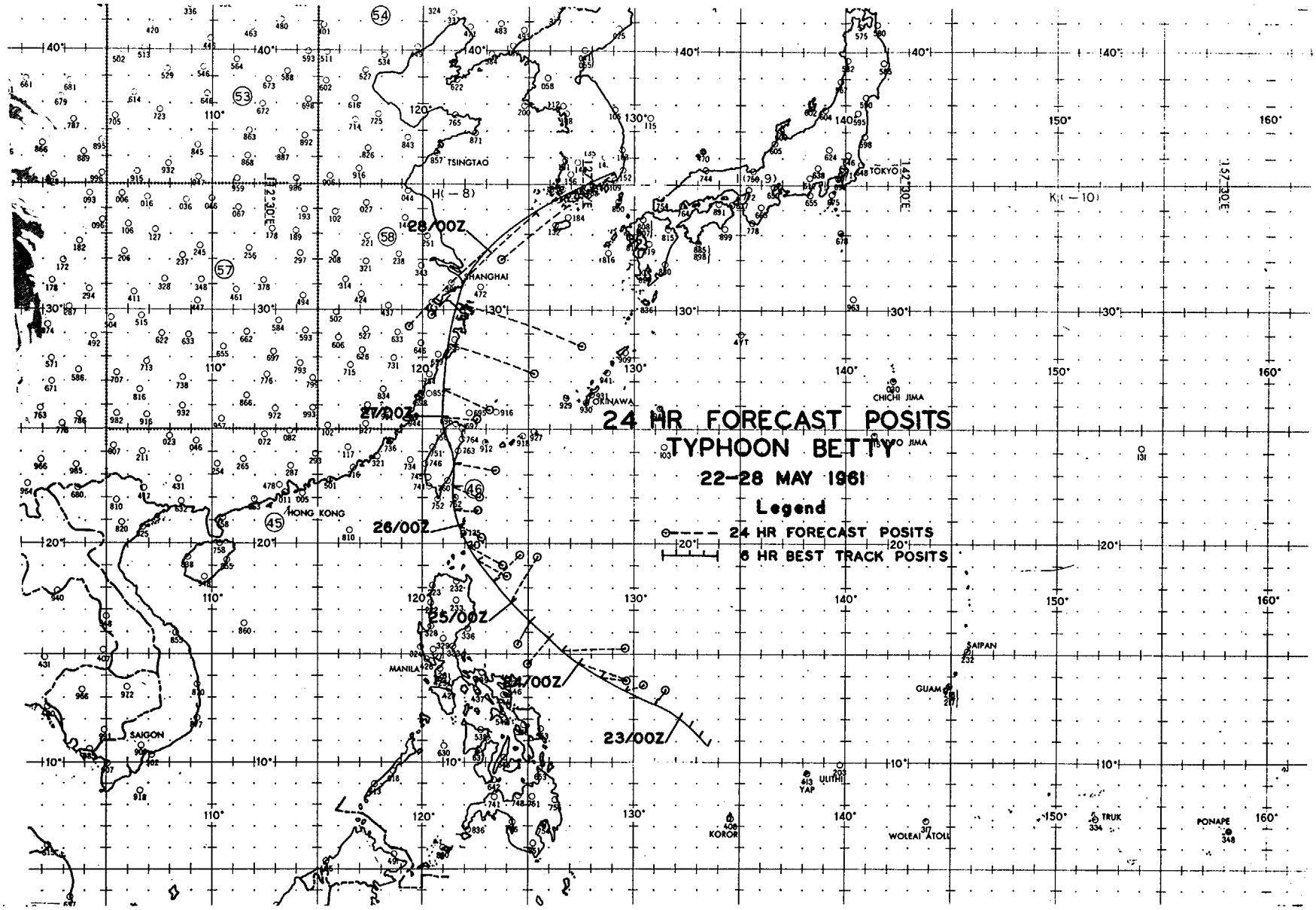
LAND RADAR AND AIRCRAFT FIXES - TYPHOON BETTY

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
1	220451Z	10.6N	133.4E	56-P-05	70	45	9990	990	18/07	CIRC 20MI DIA
2	222106Z	12.1N	132.6E	56-P-15	50	52	9820	982	16/01	CIRC DIA 50MI FILLED WITH SC
3	230500Z	12.6N	131.1E	56-P-08	75	55	9880	984	13/04	DOUBLE EYE DIA INNER EYE 20MI OUTER EYE 60MI
4	230800Z	12.9N	130.4E	56-P-10	70	55	9890	990	08/--	CIRC DIA 20MI
5	232240Z	14.6N	127.6E	56-P-02	60	70	9390	970	16/08	CIRC DIA 50MI OPEN SW HVY WALL CLDS SE
6	240345Z	15.1N	126.8E	56-P-05	100	70	9240	971	15/06	CIRC DIA 60MI
7	240810Z	15.4N	126.5E	56-P-07	100	90	9190	968	17/13	CIRC DIA 25MI
8	242212Z	17.0N	124.6E	56-P-02	60	95	8780	954	17/07	CIRC DIA 40MI WELL DEFINED WALL CLDS ALL QUADS
9	250315Z	17.8N	124.0E	56-P-01	100	95	8610	946	17/06	CIRC DIA 30MI WALL CLDS ALL QUADS WELL DEFINED
10	250907Z	18.4N	123.6E	56-P-02	---	120	8630	947	21/10	CIRC DIA 20MI
11	252320Z	20.5N	121.8E	56-P-02	---	112	8730	950	20/09	CIRC DIA 45MI
12	260310Z	21.2N	121.3E	C-130-R-U	---	---	----	---	-----	DIA 20MI
13	260443Z	21.2N	121.5E	56-P-01	---	105	8760	956	18/16	CIRC DIA 40MI
14	260545Z	21.2N	121.5E	VW1-R-10	---	---	----	---	-----	----------
15	260845Z	21.9N	121.5E	56-P-01	---	90	8830	956	16/12	CIRC DIA 40MI
16	261400Z	23.0N	121.3E	LND/RDR	---	---	----	---	-----	----------
17	261415Z	23.0N	122.1E	LND/RDR	---	---	----	---	-----	----------

TYPHOON BETTY 22-28 MAY 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG. DISTANCE	48 HR. ERROR DEG. DISTANCE
220600Z	10.7N	133.5E	-------	-------
221200Z	11.2N	133.2E	-------	-------
221800Z	11.8N	132.8E	-------	-------
230000Z	12.2N	132.2E	-------	-------
230600Z	12.7N	131.0E	031-44	-------
231200Z	13.2N	129.6E	063-60	-------
231800Z	13.9N	128.3E	096-82	-------
240000Z	14.7N	127.5E	113-140	-------
240600Z	15.2N	126.8E	093-160	156-63
241200Z	15.7N	126.0E	221-90	193-70
241800Z	16.4N	125.1E	208-75	191-98
250000Z	17.2N	124.3E	026-136	133-130
250600Z	18.1N	123.6E	033-96	090-170
251200Z	19.1N	122.9E	121-75	127-82
251800Z	19.9N	122.2E	124-101	123-114
260000Z	20.7N	121.8E	123-62	063-334
260600Z	21.3N	121.5E	089-62	060-277
261200Z	22.5N	121.5E	114-80	121-154
261800Z	23.5N	121.4E	105-106	120-179
270000Z	25.3N	120.9E	090-97	110-190
270600Z	26.6N	121.0E	112-122	097-256
271200Z	28.2N	121.3E	106-208	096-325
271800Z	30.4N	121.8E	113-326	105-400
280000Z	32.5N	122.9E	225-270	112-441
280600Z	33.8N	125.5E	228-358	123-415
281200Z	35.4N	129.0E	236-382	131-421

AVERAGE 24 HOUR ERROR 142 MI
AVERAGE 48 HOUR ERROR 229 MI


24 HR FORECAST POSITS
TYPHOON BETTY
22-28 MAY 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
28/00Z
27/00Z
26/00Z
25/00Z
24/00Z
23/00Z
TSINGTAO
SHANGHAI
OKINAWA
HONG KONG
MANILA
SAIGON
TOKYO
CHICHI JIMA
SAIPAN
GUAM
YAP
ULITHI
KOROR
WOLEAI ATOLL
TRUK
PONAPE

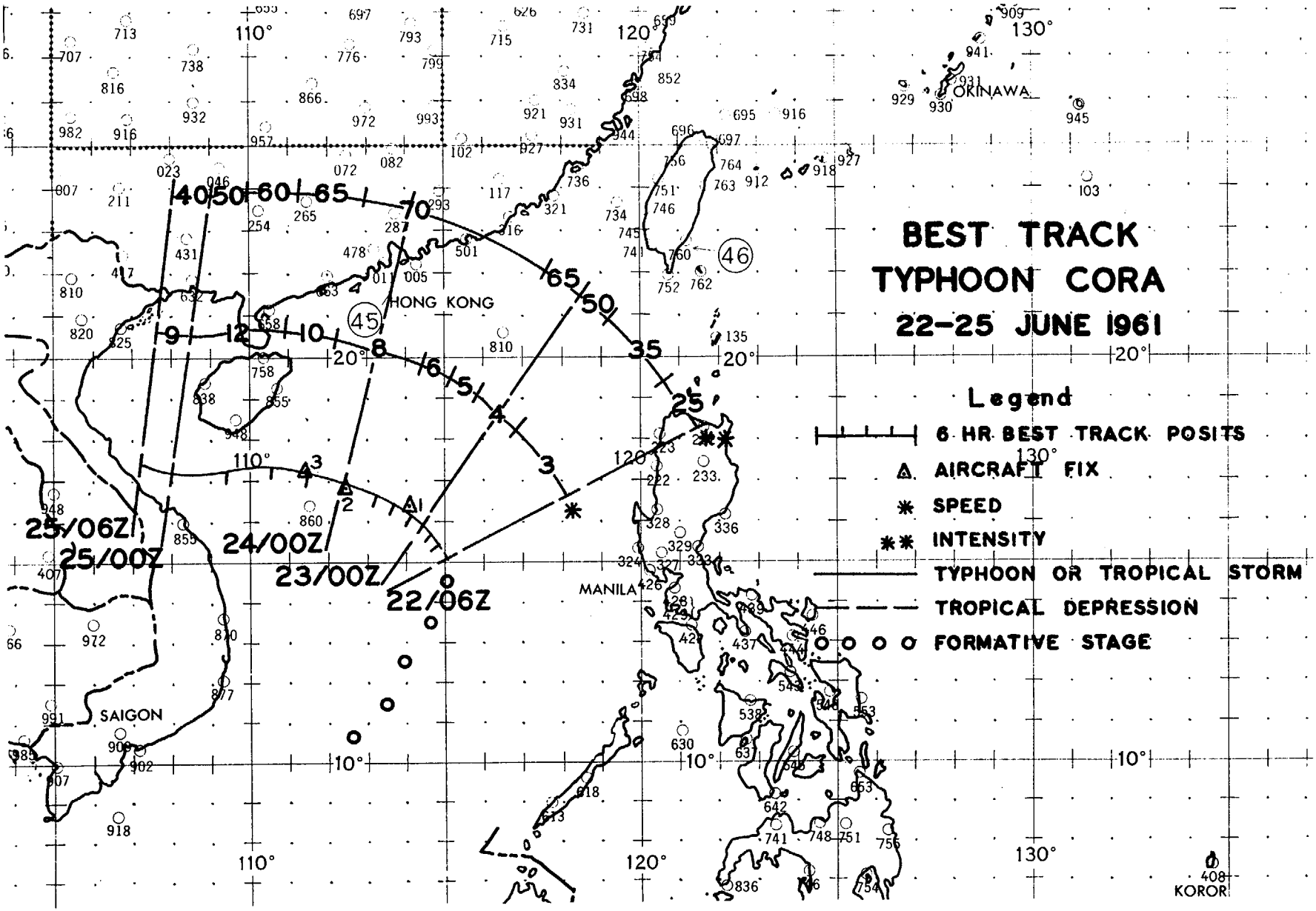
D. TYPHOON CORA (220600Z-250600Z JUNE 1961)

CORA DEVELOPED FROM THE WESTERNMOST OF A SERIES OF 1006 MB LOWS THAT FORMED A TROUGH FROM ABOUT 300 MI E OF SAIGON TO THE ISLAND OF MAJURO ON THE 190600Z SURFACE CHART. AT THIS TIME THE SURFACE PRESSURES ALONG THIS TROUGH BEGAN A SLOW DECREASE THAT RESULTED IN AN AVERAGE PRESSURE OF 1003 MB BY 220600Z, TIME OF THE FIRST WARNING AS A TROPICAL DEPRESSION TO BE LATER KNOWN AS TYPHOON CORA. THE CENTER PRESSURE OF CORA WAS APPROXIMATELY 995 MB AND THE SURFACE WINDS WERE 25 KTS AT THAT TIME.

THE 500 MB PATTERN AT TIME OF THE FIRST WARNING INDICATED THAT CORA EXISTED BETWEEN A WESTERLY FLOW NEAR THE EQUATOR AND AN ANTICYCLONE CENTERED NEAR 30N THAT SLOWLY MOVED S TO 27N DURING THE LIFE CYCLE OF CORA. MOVEMENT OF CORA NORTHWARD ACROSS THIS TROUGH ADDED AN EASTWARD COMPONENT TO THE NORTHERLY MOVEMENT OF THE LOW AT FIRST, AND LATER A WESTERLY COMPONENT THAT FINALLY BECAME THE PREDOMINANT DIRECTION OF MOVEMENT OF CORA AS IT INTENSIFIED TO TYPHOON STRENGTH AND MOVED TOWARD NORTH VIETNAM.

CORA WAS A WEAK TYPHOON WITH AN EYE VARYING FROM 40 TO 80 MI IN DIAMETER, AND HAD POORLY DEFINED WALL CLOUDS. THE FINAL WARNING WAS ISSUED WHEN CORA WAS 45 MI FROM THE POINT AT WHICH IT MOVED INLAND, 75 MI S OF VINH ALONG THE COAST OF VIETNAM.

CORA TRAVELED 500 MI DURING THE 3 DAYS THAT WARNINGS WERE ISSUED AT AN AVERAGE SPEED OF 6.9 KTS OR AT AN AVERAGE MOVEMENT OF 167 MI PER DAY. THE CYCLONE MOVED AT A MINIMUM SPEED OF 3 KTS BETWEEN 220600Z AND 221800Z; AT A MAXIMUM SPEED OF 12 KTS BETWEEN 241200Z AND 250000Z, AND HAD MAXIMUM SURFACE WIND SPEEDS OF 70 KTS BETWEEN 230600Z AND 240600Z. DAMAGE REPORTS WERE NOT RECEIVED BY JTWC, HOWEVER POSSIBLE DAMAGE COULD HAVE OCCURRED TO SHIPPING OR SMALL ISLANDS.


BEST TRACK
TYPHOON CORA
22–25 JUNE 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
HONG KONG
MANILA
SAIGON
OKINAWA
KOROR
25/06Z
25/00Z
24/00Z
23/00Z
22/06Z
110°
120°
130°
20°
10°

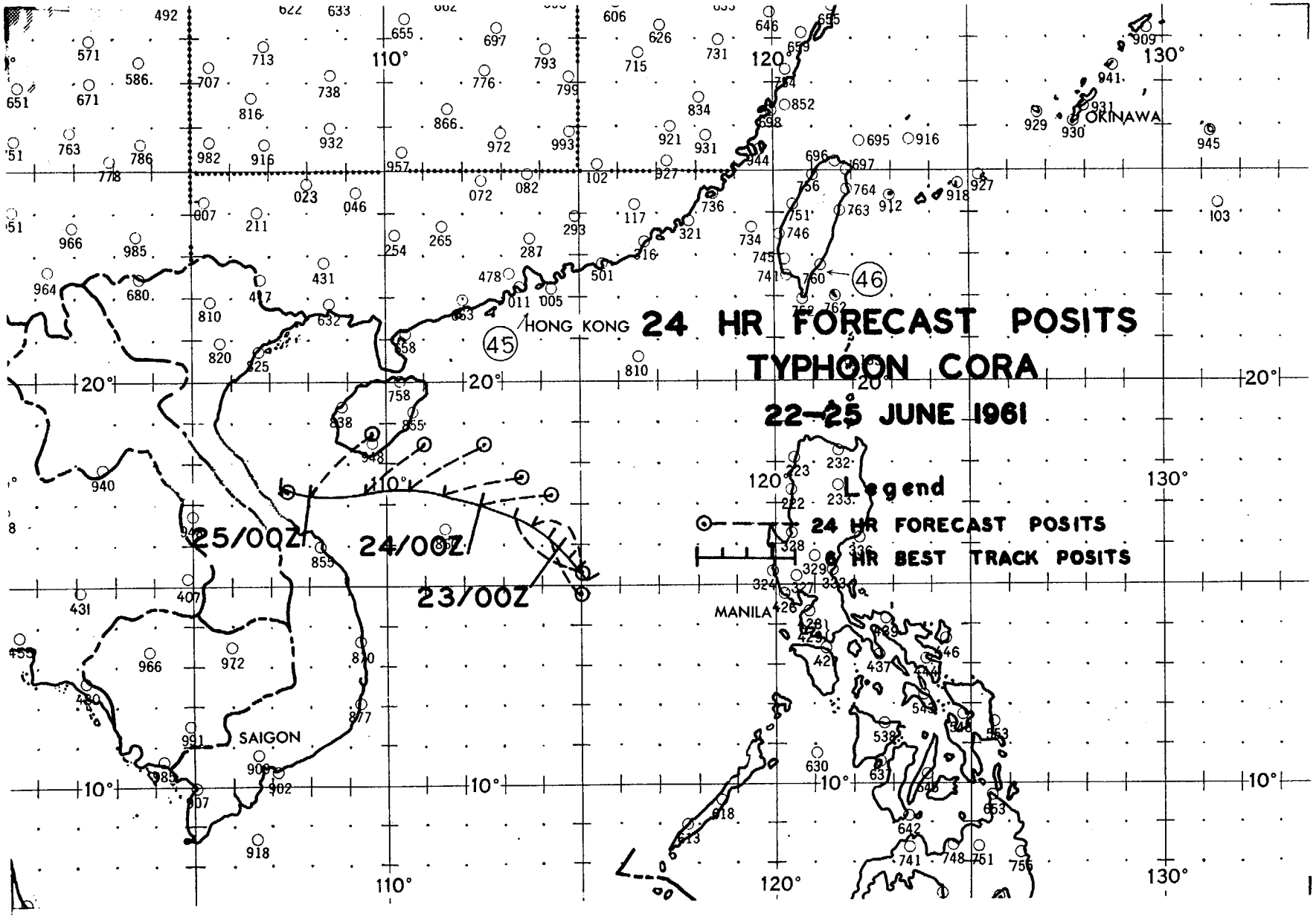
LAND RADAR AND AIRCRAFT FIXES - TYPHOON CORA

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
1	230705Z	16.3N	114.1	56-P-05	80	42	9910	991	13/09	POORLY DEFINED WALL CLD W QUAD CIRC DIA 40MI
2	232355Z	16.9N	112.4E	56-P-01	65	30	9830	989	14/09	CIRC DIA 80MI POORLY DEFINED
3	240315Z	17.1N	111.5E	56-P-1/2	75	45	9800	987	15/08	CIRC DIA 80MI WALL CLDS S & W QUADS OPEN E & N

TYPHOON CORA 22-25 JUNE 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG.	DISTANCE	48 HR. ERROR DEG.	DISTANCE
220600Z	15.2N	115.1E	-------		-------	
221200Z	15.5N	114.9E	-------		-------	
221800Z	15.8N	114.8E	-------		-------	
230000Z	16.0N	114.6E	-------		-------	
230600Z	16.3N	114.2E	-------		-------	
231200Z	16.4N	113.8E	-------		-------	
231800Z	16.7N	113.2E	-------		-------	
240000Z	16.9N	112.3E	-------		-------	
240600Z	17.2N	111.6E	065-	115	-------	
241200Z	17.3N	110.6E	062-	153	-------	
241800Z	17.2N	109.3E	048-	131	-------	
250000Z	17.1N	108.0E	042-	141	-------	
250600Z	17.4N	107.1E	122-	26	054-	278

AVERAGE 24 HOUR ERROR 113 MI
AVERAGE 48 HOUR ERROR 278 MI


24 HR FORECAST POSITS
TYPHOON CORA
22–25 JUNE 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
25/00Z
24/00Z
23/00Z
HONG KONG
MANILA
SAIGON
OKINAWA
45
46
110°
120°
130°
20°
10°

E. TYPHOON ELSIE (121200Z-150600Z JULY 1961)

ELSIE BECAME A CLOSED VORTEX ABOUT 360 MI NE OF TRUK ON THE 031200Z SURFACE CHART WITH A CENTER PRESSURE NOT LOWER THAN 1009 MB, A RATHER HIGH MINIMUM PRESSURE VALUE IN THE TROPICS. THIS WEAK CYCLONE MEANDERED 2300 MI AT AN AVERAGE SPEED OF 10 KTS IN THE EASTERLIES BEFORE A WARNING WAS ISSUED.

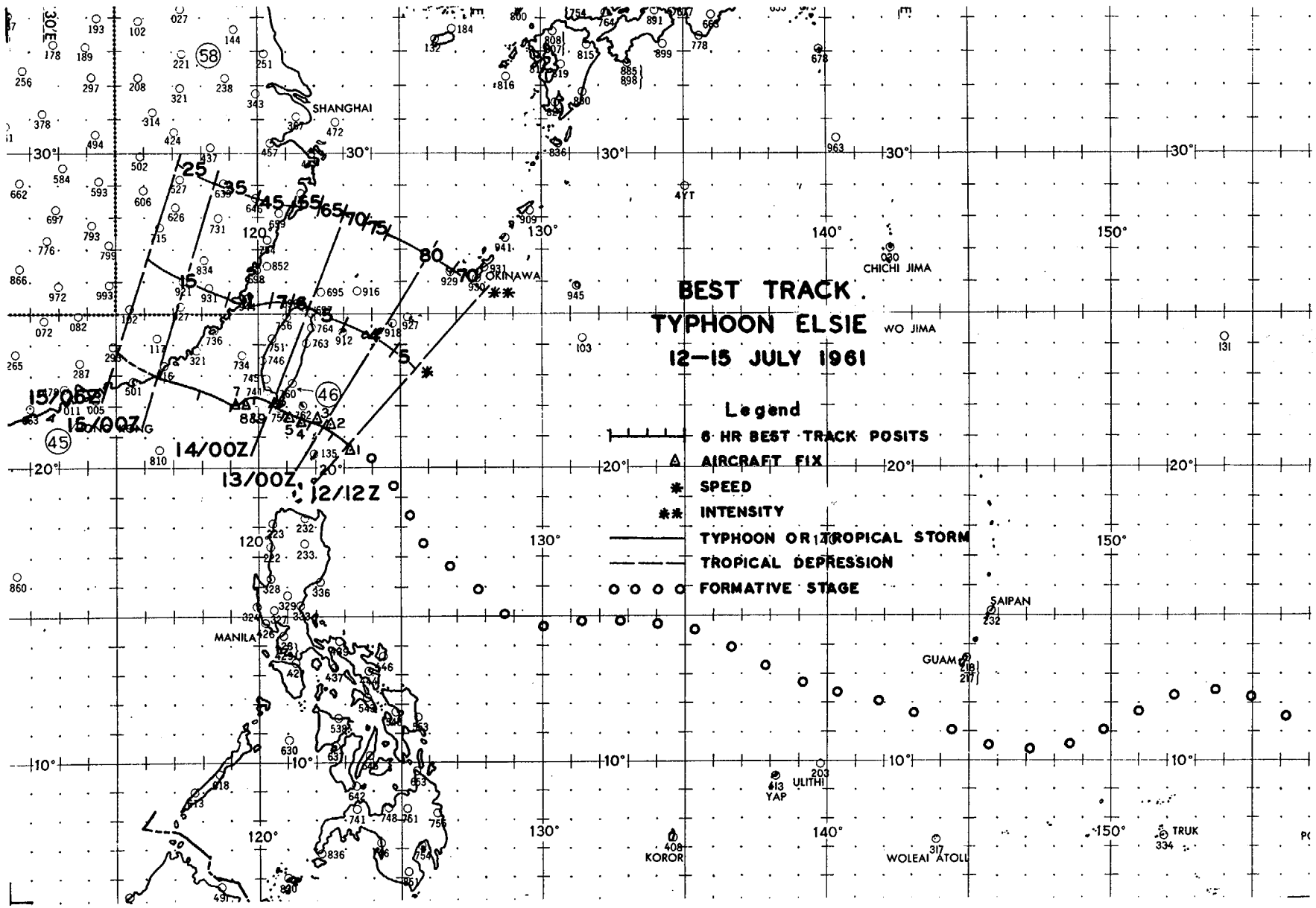
THE FIRST WARNING WAS ISSUED AFTER RECONNAISSANCE HAD DETERMINED THE POSITION OF THE CIRCULATION, AND THE FACT THAT IT HAD WALL CLOUDS. THE SURFACE WIND SPEEDS OF THE TYPHOON INTENSIFIED TO A MAXIMUM OF 80 KTS AND IT CONTINUED TO MOVE TOWARD THE S TIP OF TAIWAN, STRIKING LAND THERE AT 132000Z WITH SUSTAINED SURFACE WINDS OF 70 KTS. THE TRACK AND CONTINUED WESTERLY MOVEMENT OF ELSIE CONFIRMED THE RULE OF THUMB INDICATED BY LT. COLONEL HSU YING-CHIN, IN "THE PROBLEM OF TYPHOON FORECASTING OVER TAIWAN AND ITS VICINITY," THAT IF A STATIONARY LEEWARD INDUCED LOW FORMS NEAR TAICHUNG (46751) AND INTENSIFIES, THE TYPHOON WILL NOT RECURVE. THE INDUCED LOW BEGAN FORMING AS EARLY AS 130000Z AND WAS WELL ESTABLISHED BY TIME OF LAND STRIKE ON TAIWAN. THE TYPHOON DID NOT RECURVE.

ELSIE GRADUALLY WEAKENED AFTER PASSING TAIWAN, MOVED ACROSS THE SOUTHERN APPROACH TO TAIWAN STRAIT AND ENTERED THE ASIATIC MAINLAND 125 MI ENE OF HONG KONG. THE 35 KT SURFACE WINDS THAT EXISTED AT TIME OF LAND STRIKE RAPIDLY WEAKENED TO 15 KTS. THE LAST WARNING WAS ISSUED AT 150600Z WHEN THE CYCLONE WAS 90 MI INLAND, AND 105 MI NE OF HONG KONG.

THE USE OF EXTRAPOLATION, CLIMATOLOGY AND THE 500 MB CHART PROVIDED THE BEST GUIDE FOR FORECASTING THE VELOCITY OF ELSIE. THE 500 MB SPACE MEAN CHART WAS OF LITTLE USE UNTIL 14 JULY, AND THE 200 MB CHART SUGGESTED A MORE SOUTHERLY MOVEMENT THAN THAT WHICH OCCURRED. A TROPICAL CYCLONE OF 23-24 JULY 1944 WAS USED AS A CLIMATOLOGY MODEL.

LIMITED DATA INDICATED THAT ELSIE EXTENDED UPWARD THROUGH THE 40,000 FT LEVEL A FEW HOURS BEFORE PASSING ACROSS THE S TIP OF TAIWAN. THE TYPHOON MOVED 495 MI DURING THE 2 DAYS AND 18 HOURS THAT WARNINGS WERE ISSUED AT AN AVERAGE SPEED OF 7.5 KTS OR 180 MI PER DAY. ELSIE MOVED AT A MINIMUM SPEED OF 4 KTS BETWEEN 121800Z AND 131200Z; AT A MAXIMUM SPEED OF 15 KTS BETWEEN 141800Z AND 150600Z, AND HAD A MAXIMUM SURFACE WIND SPEED OF 80 KTS BETWEEN 121800Z AND 131200Z.

ELSIE CAUSED DAMAGE ON TAIWAN AND THE ASIATIC MAINLAND. STRONG WINDS AND HEAVY RAINS CAUSED SOME CROP DAMAGE, LOSS OF SEVERAL POWER LINES, AND LEFT 345 PERSONS HOMELESS. THE PINGTUNG AREA WAS HARDEST HIT AND ONE MAN WAS REPORTED DROWNED THERE. ONE TAIWANESE MAN WAS ALSO REPORTED DROWNED WHEN HE ATTEMPTED TO CROSS A SWOLLEN STREAM AND FELL INTO THE WATER NEAR HIS HOME IN JUALIEN. INFORMATION IS NOT AVAILABLE CONCERNING DAMAGE ON THE ASIATIC MAINLAND.


BEST TRACK
TYPHOON ELSIE
12–15 JULY 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
SHANGHAI
OKINAWA
CHICHI JIMA
WO JIMA
HONG KONG
MANILA
SAIPAN
GUAM
YAP
ULITHI
KOROR
WOLEAI ATOLL
TRUK
15/06Z
15/00Z
14/00Z
13/00Z
12/12Z

LAND RADAR AND AIRCRAFT FIXES - TYPHOON ELSIE

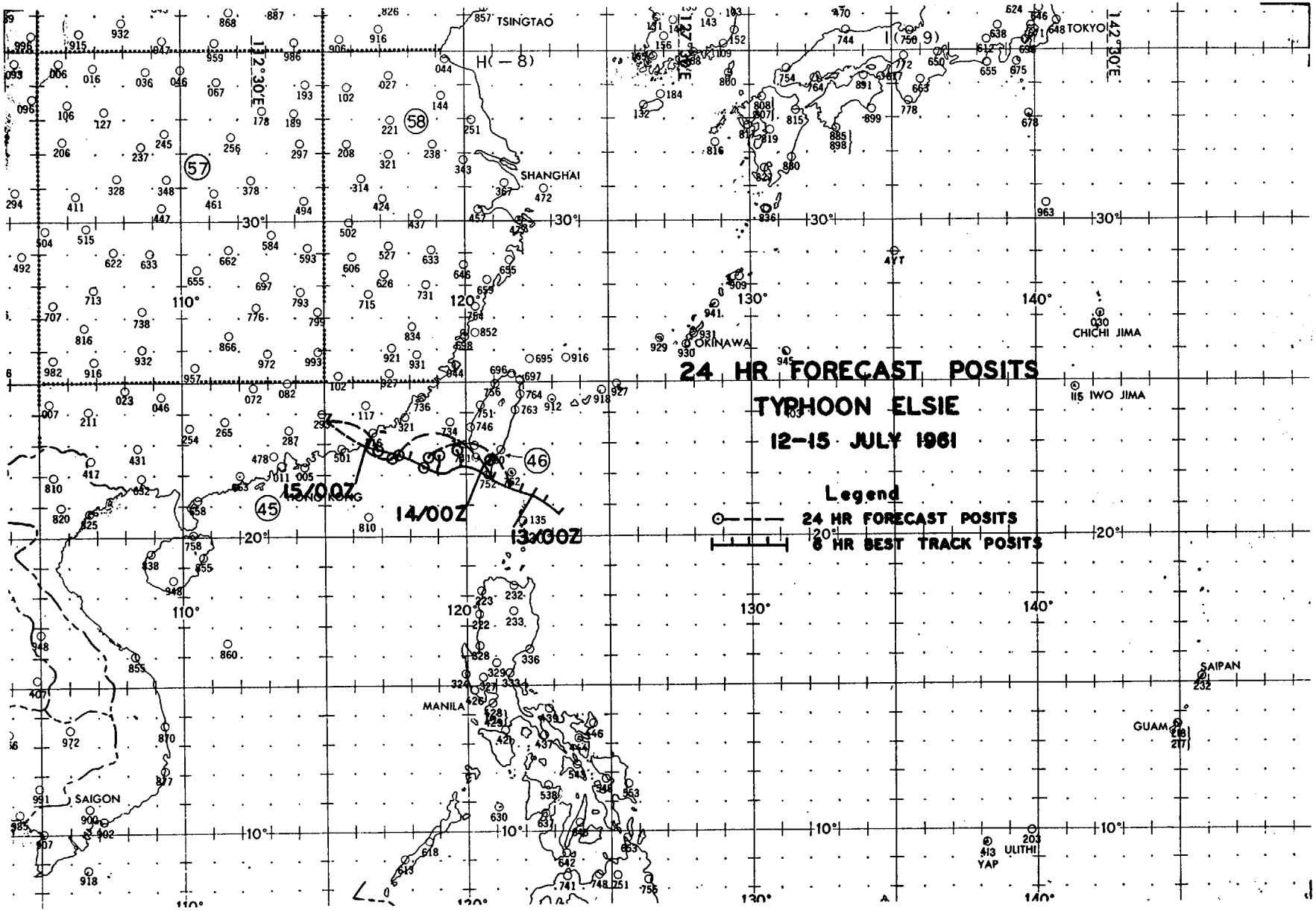
FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/Td (°C)	EYE CHARACTERISTICS
1	120810Z	20.7N	123.2E	VW1-R-10	---	---	----	---	-----	DIA 70MI
2	122245Z	21.3N	122.7E	56-P-04	100	75	9680	986	13/13	NOT DEFINED ON RADAR
3	130330Z	21.5N	122.1E	56-P-03	75	40	9420	974	16/11	CIRC 35MI DIA POORLY DEFINED
4	130930Z	21.6N	121.6E	56-P-03	100	60	9430	975	16/16	ELLIP DIA 18MI SSW-NNE & 10MI WNW-ESE WALL CLDS ALL QUADS
5	131530Z	21.7N	121.1E	VW1-R-02	---	---	----	---	-----	DIA 45MI SPIRAL BANDS 160MI DIA ALL QUADS EXCEPT NE
6	132200Z	22.1N	120.7E	56-P-01	90	*60	*18500	---	*01/01	DIA 30MI
7	140400Z	22.0N	119.2E	56-P-05	---	*60	9840	986	12/11	DIA 40MI
8	140937Z	22.0N	119.5E	56-P-15	25	35	9860	990	11/11	NOT WELL DEFINED NO WALL CLDS
9	141610Z	22.0N	119.5E	VW1-R-U	---	---	----	---	-----	NO EYE VISIBLE NORTH SEMICIRC APPEARS CLEAR.

*500MB DATA.

TYPHOON ELSIE 12-15 JULY 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG.	DISTANCE	48 HR. ERROR DEG.	DISTANCE
121200Z	20.8N	123.1E	-------		-------	
121800Z	21.2N	122.7E	-------		-------	
130000Z	21.4N	122.3E	-------		-------	
130600Z	21.6N	121.8E	-------		-------	
131200Z	21.7N	121.4E	290	164	-------	
131800Z	21.8N	120.9E	286	196	-------	
140000Z	22.2N	120.5E	042	23	-------	
140600Z	22.2N	119.8E	339	44	-------	
141200Z	21.9N	119.1E	348	34	288	265
141800Z	22.4N	118.0E	119	31	283	260
150000Z	22.9N	116.4E	121	62	076	89
150600Z	23.9N	115.1E	124	118	105	79

AVERAGE 24 HOUR ERROR 84 MI
AVERAGE 48 HOUR ERROR 173 MI


24 HR FORECAST POSITS
TYPHOON ELSIE
12-15 JULY 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
15/00Z
14/00Z
13/00Z
TSINGTAO
SHANGHAI
TOKYO
OKINAWA
CHICHI JIMA
IWO JIMA
HONG KONG
MANILA
SAIGON
SAIPAN
GUAM
YAP
ULITHI
112°30'E
127°30'E
142°30'E
110°
120°
130°
140°
10°
20°
30°

F. TYPHOON HELEN (270600Z JULY - 031800Z AUGUST 1961)

A SMALL LOW BOUNDED BY A 1006 MB ISOBAR WAS NOTED AT 8.0N 150.0E ON THE 210600Z SURFACE CHART. THIS CIRCULATION MOVED W AND PASSED 150 MI S OF GUAM JUST AFTER 221800Z, AND THEN PASSED INTO THE LARGE TROUGH THAT EXTENDED FROM THE ASIATIC MAINLAND INTO THE PACIFIC OCEAN TOWARD GUAM. THE TROUGH THEN INTENSIFIED AND A CLOSED CIRCULATION FORMED THAT WAS FIRST OBSERVED ON THE 251200Z SURFACE CHART. THIS CIRCULATION DEEPENED AND FINALLY BECAME TYPHOON HELEN. THE FIRST WARNING WAS ISSUED AT 270600Z CLASSIFYING HELEN AS A STORM BASED ON WEATHER RECONNAISSANCE. HELEN BECAME A TYPHOON AT 280000Z, CONTINUED MOVING SLOWLY NNW TO NEAR 28.0N AND 129.8E WHERE IT LOOPED AND THE SURFACE WIND SPEEDS DECREASED FROM 80 KTS TO 45 KTS. THE LOOP OCCURRED AROUND AMAMI-O-SHIMA (47909), THUS WITH RECONNAISSANCE AND THE LAND STATION, SUFFICIENT DATA WAS AVAILABLE TO RECORD THE DIRECTION AND SPEED OF MOVEMENT. THE CYCLONIC LOOP WAS 20 BY 40 MI, ORIENTED WNW, AND REQUIRED ABOUT 24 HOURS TO COMPLETE. UPON COMPLETION OF THE LOOP, HELEN CONTINUED ALONG A NNW TRACK MISSING KYUSHU BY MOVING 35 MI TO THE W. THE TROPICAL STORM PASSED ONTO KOREA AT 021600Z ABOUT 60 MI WSW OF PUSAN, MOVED UP THE PENINSULA, TURNED TO THE NE AND DEPARTED THE COAST 45 MI SE OF WONSAN AT ABOUT THE TIME OF THE LAST WARNING, 031800Z. HELEN DID NOT REGAIN ITS INTENSITY AFTER LOOPING, BUT CONTINUED TO SLOWLY WEAKEN AND BECAME A TROPICAL DEPRESSION AT 030000Z.

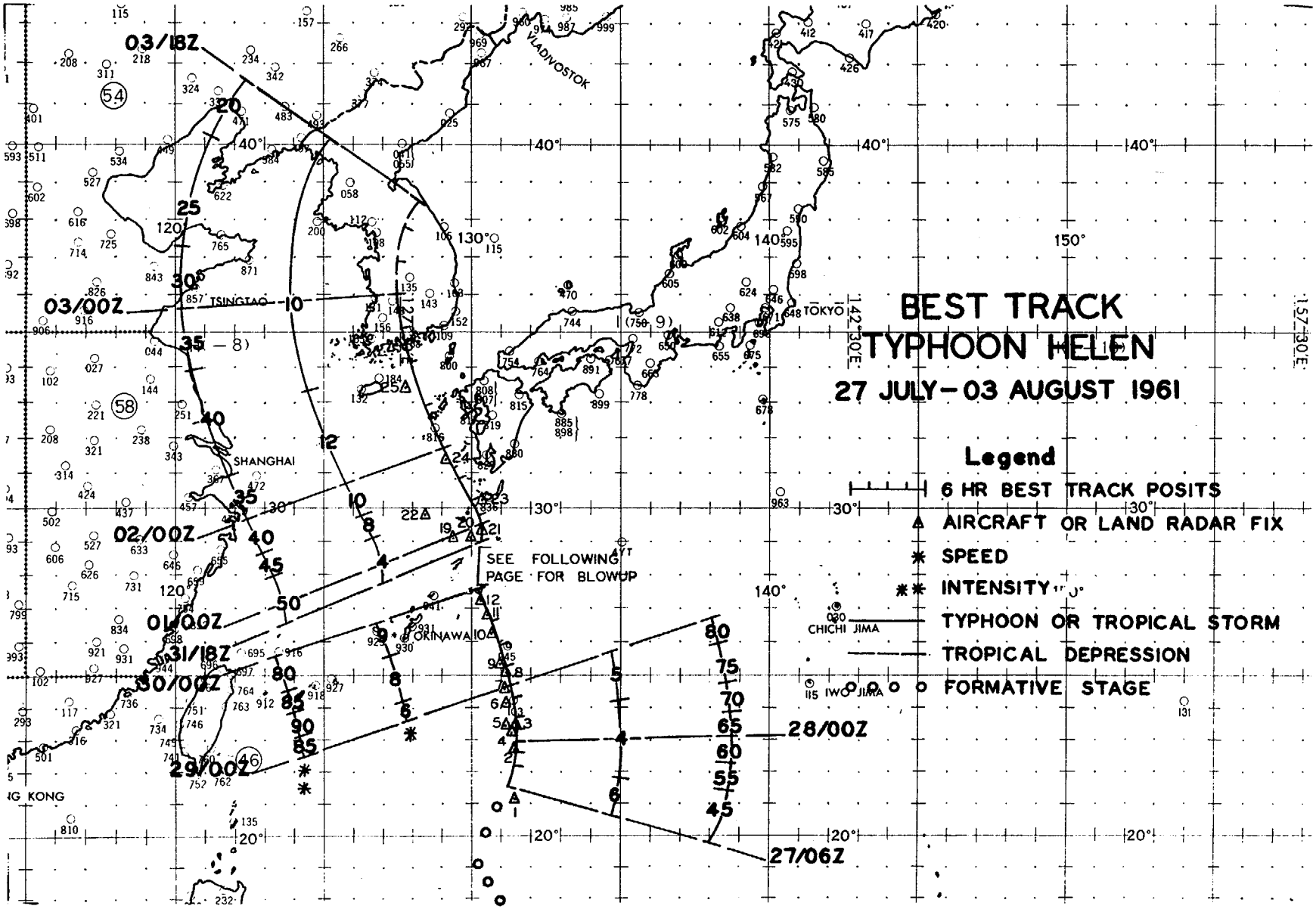
THE SYNOPTIC SITUATION RELATING TO TYPHOON HELEN CAN BEST BE INDICATED BY DESCRIBING THE 500 MB SPACE MEAN CHART AND THE MOVEMENT OF THE ASSOCIATED ANTICYCLONE NE OF HELEN DURING ITS LIFE CYCLE. A SIMILAR SITUATION OCCURRED WITH SEVERAL OTHER CYCLONES AND WILL BE REFERRED TO IN THE NARRATIVE OF OTHER TYPHOONS. THIS DESCRIPTION ALSO SATISFIES THE ACTIVITY THAT TRANSPIRED AT THE 200 MB LEVEL DURING THIS TIME INTERVAL. AT THE TIME OF ISSUE OF THE FIRST WARNING ON HELEN, AN ANTICYCLONE EXISTED NEAR 35N 150E WITH A TROUGH OVER THE ASIATIC MAINLAND ROUGHLY ALONG 110E. BY 280000Z THE ANTICYCLONE HAD MOVED SLIGHTLY E TO 32N 157E. TWENTY-FOUR HOURS LATER A WESTERLY MOVEMENT COMMENCED AND CONTINUED UNTIL THE ANTICYCLONE REACHED 30N 134E AT 040000Z. A SMALL RIDGE OF VARYING INTENSITY EXISTED IN THE SOUTH CHINA SEA DURING THIS PERIOD OF TIME. HELEN MOVED SLIGHTLY W OF N AS IT PASSED AROUND THE WESTERN SIDE OF THE PACIFIC ANTICYCLONE E OF JAPAN.

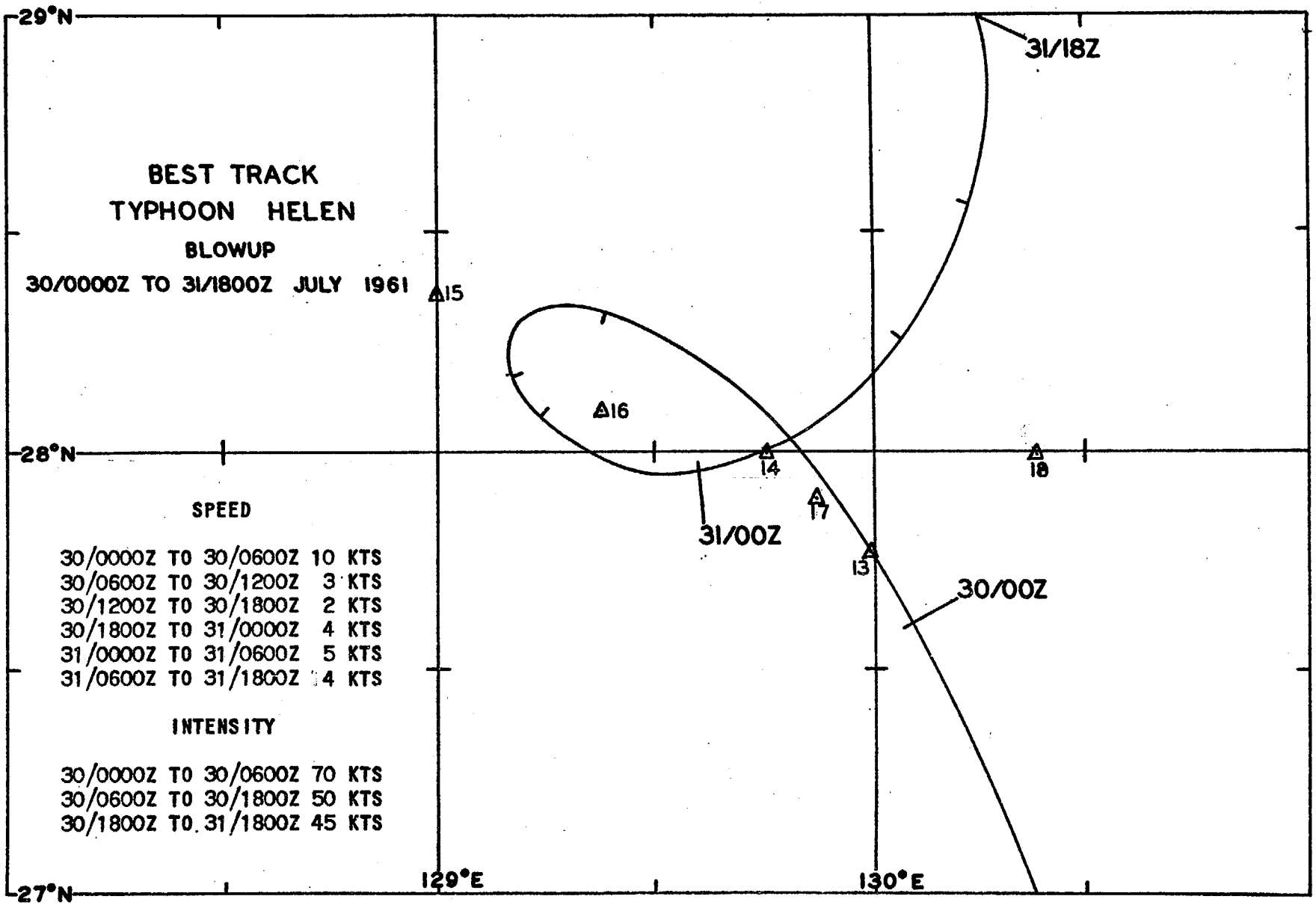
WITH THE EXCEPTION OF THE LOOP, HELEN CREATED NO FORECAST PROBLEMS OF AN UNUSUAL NATURE. THE TWO TYPHOONS, HELEN AND IDA, BETTER KNOWN AS THE TWINS, CREATED FORECAST DIFFICULTIES THAT WILL BE DISCUSSED IN THE IDA NARRATIVE.

TYPHOON HELEN TRAVELED 1195 MI IN 7 AND ONE HALF DAYS AT AN AVERAGE SPEED OF 6.6 KTS OR 159 MI PER DAY, FROM FIRST TO LAST WARNING. THE MINIMUM SPEED WAS 2 KTS BETWEEN 301200Z AND 301800Z; THE MAXIMUM SPEED WAS 12 KTS BETWEEN 020000Z AND 021200Z. THE MAXIMUM

SURFACE WIND WAS 90 KTS BETWEEN 290600Z AND 291200Z.

AMAMI-O-SHIMA AND OTHER ISLANDS NEARBY WERE THE ONLY AREAS AFFECTED BY HELEN, EVEN THOUGH THE TYPHOON WAS NEAR KYUSHU AND EVENTUALLY PASSED ONTO KOREA. THE TYPHOON IS REPORTED TO HAVE INUNDATED ABOUT 2,000 HOUSES, CAUSED TWO DEATHS AND SEVERAL INJURIES ON THESE ISLANDS JUST S OF KYUSHU.


BEST TRACK
TYPHOON HELEN
27 JULY – 03 AUGUST 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT OR LAND RADAR FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
03/18Z
03/00Z
02/00Z
01/00Z
31/18Z
30/00Z
29/00Z
28/00Z
27/06Z
SEE FOLLOWING PAGE FOR BLOWUP
SHANGHAI
TSINGTAO
TOKYO
OKINAWA
CHICHI JIMA
IWO JIMA
VLADIVOSTOK
142.3°E
157.3°E


BEST TRACK
TYPHOON HELEN
BLOWUP
30/0000Z TO 31/1800Z JULY 1961
SPEED
30/0000Z TO 30/0600Z 10 KTS
30/0600Z TO 30/1200Z 3 KTS
30/1200Z TO 30/1800Z 2 KTS
30/1800Z TO 31/0000Z 4 KTS
31/0000Z TO 31/0600Z 5 KTS
31/0600Z TO 31/1800Z 4 KTS
INTENSITY
30/0000Z TO 30/0600Z 70 KTS
30/0600Z TO 30/1800Z 50 KTS
30/1800Z TO 31/1800Z 45 KTS
29°N
28°N
27°N
129°E
130°E
15
16
14
17
13
18
31/18Z
31/00Z
30/00Z

LAND RADAR AND AIRCRAFT FIXES - TYPHOON HELEN

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
1	270632Z	21.1N	131.5E	VW1-P-02	45	---	----	990	-----	DIA 15 MI
2	272200Z	22.7N	131.5E	56-P-07	70	50	9880	992	16/11	CIRC DIA 50MI
3	280500Z	23.5N	131.5E	VW1-R-02	---	---	----	---	-----	ELLIP 8X12 MI
4	280657Z	23.3N	131.4E	VW1-R-03	---	---	----	---	-----	CIRC DIA 18MI
5	280900Z	23.4N	131.3E	56-P-04	75	45	9700	987	16/13	CIRC DIA 40MI OPEN NE
6	281530Z	24.1N	131.3E	VW1-R-05	---	---	----	---	-----	DIA 27MI OPEN S
7	282200Z	24.4N	131.2E	56-P-00	70	60	9480	978	17/14	OPEN W DIA 25MI
8	290330Z	25.0N	131.3E	56-P-01	75	60	9570	979	16/14	CIRC 20MI DIA
9	290900Z	25.3N	131.0E	56-P-05	80	65	9370	971	17/12	CIRC 20MI DIA OPEN SE TO S
10	291335Z	26.3N	130.8E	VW1-R-04	---	---	----	---	-----	DIA 27MI
11	291830Z	26.8N	130.5E	LND/RDR	---	---	----	---	-----	----------
12	292200Z	27.3N	130.3E	56-P-01	100	65	9510	976	19/15	CIRC WELL DEFINED WALL CLDS
13	300145Z	27.8N	130.0E	56-P-03	100	70	9490	---	19/14	CIRC 40MI DIA WELL DEFINED
14	300400Z	28.0N	129.8E	56-P-01	100	75	9490	976	18/14	CIRC 30MI DIA
15	301600Z	28.4N	129.0E	VW1-R-05	---	---	----	---	-----	WELL DEFINED EYE
16	302230Z	28.1N	129.4E	56-P-1/2	40	30	9890	986	12/10	CIRC 50MI DIA OPEN E-S
17	310330Z	27.9N	129.9E	56-P-1/2	---	30	9890	982	15/13	CIRC DIA 50MI
18	310600Z	28.0N	130.4E	56-P-1/2	65	40	9910	987	17/13	CIRC DIA 50MI
19	311445Z	29.0N	129.5E	VW1-P-20	---	---	----	---	-----	40MI DIA NO WALL CLDS
20	312155Z	29.1N	130.0E	56-P-02	40	30	9890	986	13/12	POORLY DEFINED
21	010854Z	29.2N	130.5E	USN-R-01	---	---	----	---	-----	3 MI DIA WALL CLDS ALL QUADS
22	010930Z	29.8N	128.5E	56-P-05	30	40	9920	988	14/13	POORLY DEFINED

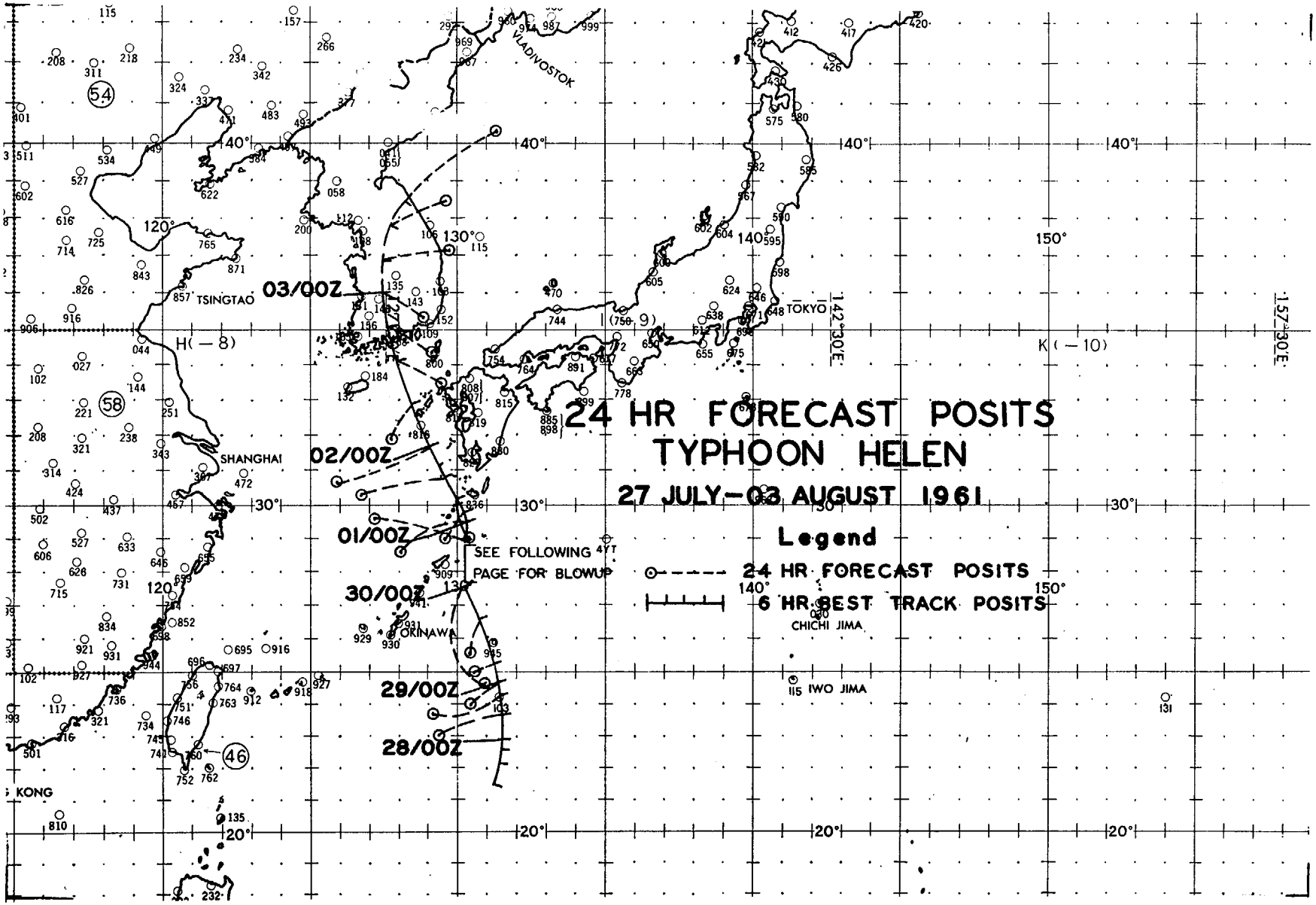
LAND RADAR AND AIRCRAFT FIXES - TYPHOON HELEN (CONT'D)

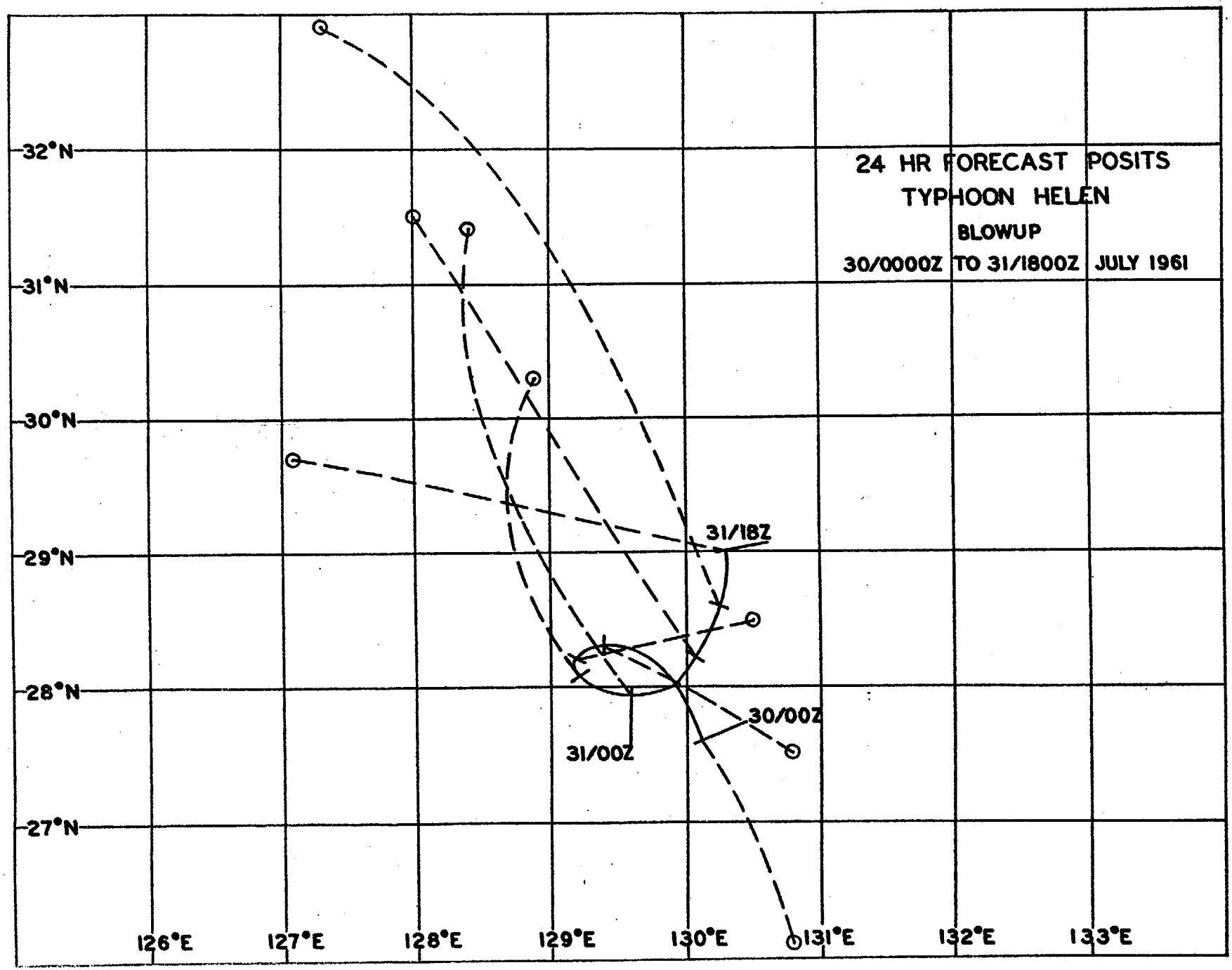
FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
23	011200Z	30.1N	130.4E	USN-R-02	---	---	-----	---	-----	DIA 4 MI
24	012130Z	31.4N	129.1E	56-P-02	25	---	9810	983	15/11	VERY DIFFUSE
25	020930Z	33.2N	127.9E	56-P-05	30	30	9770	985	14/12	CIRC 10 MI DIA

TYPHOON HELEN 27 JUL-03 AUG 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG. DISTANCE	48 HR. ERROR DEG. DISTANCE
270600Z	21.5N	131.3E	-------	-------
271200Z	22.1N	131.4E	-------	-------
271800Z	22.5N	131.6E	-------	-------
280000Z	22.8N	131.7E	-------	-------
280600Z	23.3N	131.6E	254-127	-------
281200Z	23.7N	131.5E	269-133	-------
281800Z	24.2N	131.4E	260-52	-------
290000Z	24.6N	131.3E	125-46	-------
290600Z	25.3N	131.1E	115-41	268-212
291200Z	25.9N	130.8E	350-70	270-210
291800Z	26.7N	130.5E	345-110	218-75
300000Z	27.6N	130.1E	335-100	206-54
300600Z	28.3N	129.4E	125-78	194-67
301200Z	28.3N	129.2E	080-83	148-170
301800Z	28.1N	129.2E	170-130	144-138
310000Z	27.9N	129.6E	165-210	295-56
310600Z	28.2N	130.1E	154-230	164-156
311200Z	28.6N	130.2E	150-300	164-185
311800Z	29.0N	130.3E	112-110	155-462
010000Z	29.4N	130.2E	068-127	158-481
010600Z	29.8N	130.1E	210-50	146-358
011200Z	30.2N	130.0E	348-68	148-467
011800Z	30.9N	129.7E	257-145	109-257
020000Z	31.8N	129.2E	251-178	234-200
020600Z	32.9N	128.7E	215-78	221-169
021200Z	34.1N	128.1E	230-153	210-175
021800Z	35.1N	127.8E	118-70	224-280
030000Z	36.0N	127.4E	128-88	236-335
030600Z	36.9N	127.2E	088-130	256-130
031200Z	37.9N	127.6E	067-108	260-167
031800Z	38.7N	128.3E	053-185	066-123

AVERAGE 24 HOUR ERROR 119 MI
AVERAGE 48 HOUR ERROR 214 MI


24 HR FORECAST POSITS
TYPHOON HELEN
27 JULY–03 AUGUST 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
03/00Z
02/00Z
01/00Z
30/00Z
29/00Z
28/00Z
SEE FOLLOWING PAGE FOR BLOWUP
VLADIVOSTOK
TSINGTAO
SHANGHAI
OKINAWA
TOKYO
CHICHI JIMA
IWO JIMA
H(−8)
K(−10)
(750 9)
142°30'E
157°30'E
120°
130°
140°
150°
40°
30°
20°


24 HR FORECAST POSITS
TYPHOON HELEN
BLOWUP
30/0000Z TO 31/1800Z JULY 1961
32°N
31°N
30°N
29°N
28°N
27°N
126°E
127°E
128°E
129°E
130°E
131°E
132°E
133°E
31/18Z
30/00Z
31/00Z

G. TYPHOON IDA (280600Z-311800Z JULY 1961)

TYPHOON IDA ORIGINATED TO THE E OF HELEN IN THE TROUGH THAT EXTENDED FROM THE ASIATIC MAINLAND. THE LOW FIRST APPEARED ON THE SURFACE CHART NEAR 21N 144E, ABOUT 850 MI E OF HELEN AT 260600Z. THE CIRCULATION SLOWLY DRIFTED TOWARD IWO JIMA AND GAVE LITTLE INDICATION OF SIGNIFICANT INTENSITY. THE FEW WINDS AVAILABLE HAD A STRENGTH VARYING FROM 5 TO 20 KTS. AT ABOUT 280500Z, FUCHU AIR FORCE WEATHER CENTRAL ADVISED JTWC OF A SHIP REPORT AND AIRCRAFT REPORT THAT INDICATED SURFACE WINDS IN EXCESS OF 40 KTS. THE FIRST WARNING WAS ISSUED ON IDA AS A TROPICAL STORM BASED ON THIS DATA. THE LIFE OF THE "TWINS" (HELEN-IDA) COMMENCED WITH THIS WARNING; IDA BECAME A TYPHOON AT 290000Z, ABOUT 125 MI SE OF IWO JIMA AND PASSED WITHIN 20 MI OF THAT ISLAND TO THE NE. THE LOWEST SLP WAS RECORDED BY IWO JIMA AS 985.5 MB AT 291030Z. SURFACE WINDS REACHED 35 KTS WITH GUSTS TO 57 KTS AT 1112Z. THESE WINDS OCCURRED AFTER THE CENTER PASSED AND WERE FROM THE WNW. THE SURFACE WINDS WERE OF LEAST INTENSITY AROUND THE TYPHOON IN THE LEFT SEMICIRCLE AND STRONGEST IN THE RIGHT FRONT QUADRANT, INDICATED BY SURFACE AND RECONNAISSANCE REPORTS, THEREFORE IWO JIMA HAD COMPARATIVELY LIGHT WINDS WITH THE TYPHOON PASSAGE.

IDA CONTINUED TO INTENSIFY UNTIL 300000Z AND THEN BEGAN TO DISSIPATE, PROBABLY DO TO ITS PROXIMITY TO HELEN. THE TYPHOON MOVED ON A TRACK GENERALLY NW UNTIL AFTER 301800Z, THEN TURNED WESTWARD THEN WSW TO THE N OF HELEN. AT 311800Z, THE TIME OF THE LAST WARNING, IDA WAS IMBEDDED IN THE CIRCULATION OF HELEN AND APPEARED TO BE NO LONGER A SEPARATE CLOSED CIRCULATION. OF THE TWINS, IDA WAS THE WEAKER ONE WHOSE MOVEMENT APPEARED TO BE PARTIALLY CONTROLLED BY HELEN. AS IDA APPROACHED HELEN THE EFFECT UPON IDA BECAME MORE SIGNIFICANT. AT 290000Z, IDA AND HELEN WERE ABOUT 670 MI APART AND IDA WAS INTENSIFYING. BY 300000Z THE TWO TYPHOONS WERE 455 MI FROM EACH OTHER AND IDA WAS WEAKENING EVEN THOUGH GENERAL ATMOSPHERIC CONDITIONS WERE SUITABLE FOR FURTHER INTENSIFICATION WITH THE EXCEPTION OF THE PRESENCE OF HELEN. BY 310000Z IDA WAS 230 MI FROM HELEN AND WAS IMBEDDED IN THE CIRCULATION OF HELEN. IT SHOULD BE NOTED THAT BOTH CIRCULATIONS ACHIEVED MAXIMUM INTENSITY WHILE ABOUT 570 MI APART AT ABOUT THE SAME TIME (HELEN, 90 KTS 290600Z-291200Z, IDA, 80 KTS 291200Z-300000Z), THEN COMMENCED DISSIPATING AS THE TWO APPROACHED EACH OTHER.

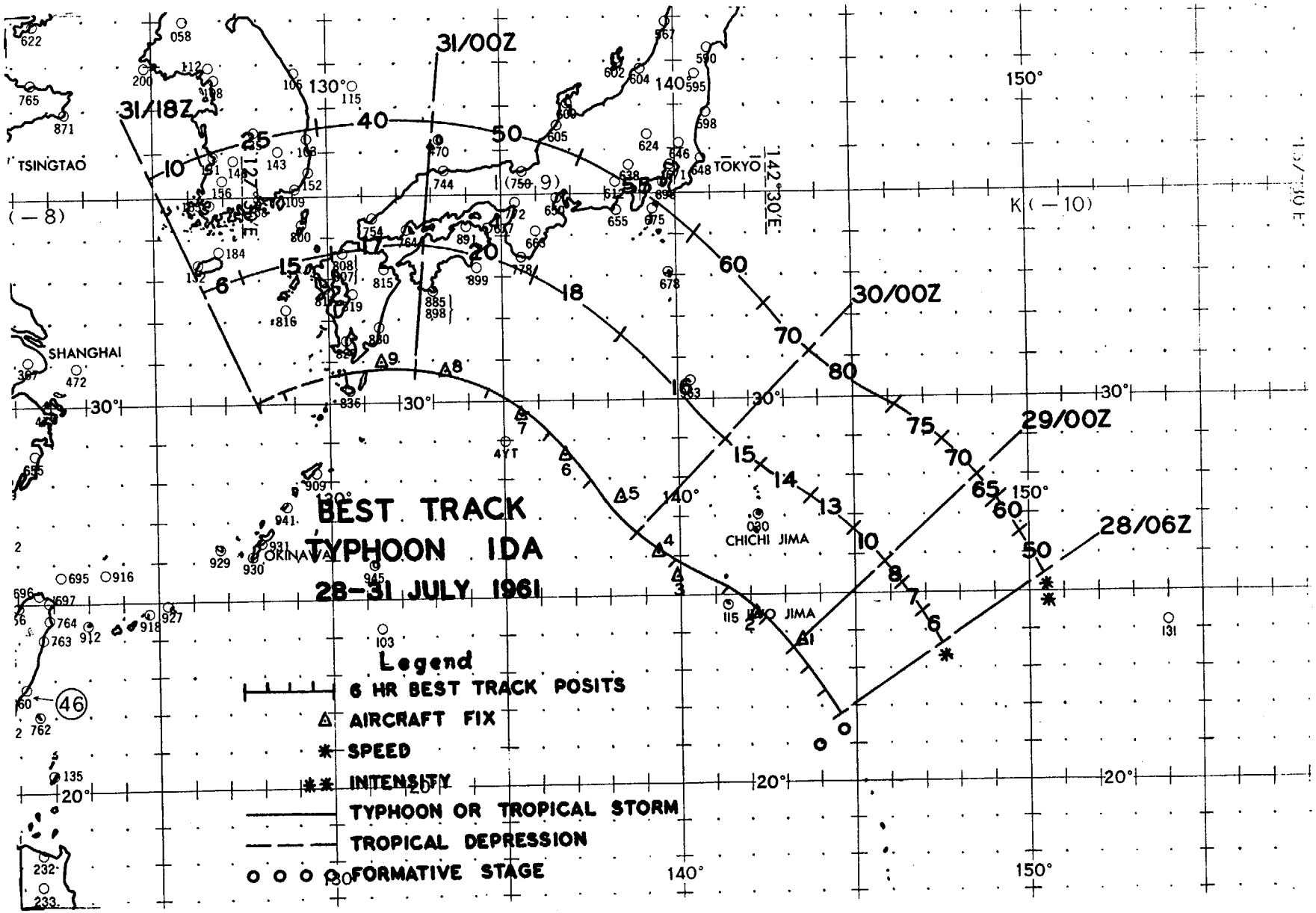
IDA WAS INFLUENCED BY THE HIGH PRESSURE CELL MOVING WESTWARD AS DESCRIBED IN THE HELEN NARRATIVE. THE FUJIWHARA EFFECT WAS CLASSICAL, RESULTING IN THE DISSIPATION AND PARTIAL CONTROL OF THE MOVEMENT OF IDA.

THE FORECAST PROBLEMS AND FORECAST ERRORS (250 MI FOR 11 FORECASTS OF 24 HOURS, 397 MI FOR 7 OUTLOOKS OF 48 HOURS) WERE GREATER ON THIS TYPHOON THAN ANY OTHER OF THE SEASON. THE FUJIWHARA EFFECT WAS IGNORED, EVEN THOUGH IT WAS SUGGESTED BY FAFWC, AND A CONTINUOUS ATTEMPT TO FORECAST THE TYPHOON TO THE RIGHT OF ITS TRACK WAS MADE,

WITH RECURVATURE OR WITH THE EXPECTATION THAT HELEN AND IDA WOULD MOVE FURTHER APART, WITH THE LATTER STRIKING JAPAN.

IDA TRAVELED 1090 MI AT AN AVERAGE SPEED OF 13 KTS IN THE THREE AND ONE HALF DAYS THAT WARNINGS WERE ISSUED. THE MINIMUM SPEED WAS 6 KTS BETWEEN 260600Z AND 281200Z. THE MAXIMUM SPEED WAS 20 KTS BETWEEN 301800Z AND 310000Z. THE MAXIMUM SURFACE WIND SPEED WAS 80 KTS BETWEEN 291200Z AND 300000Z.

IDA CREATED GREATER THAN NORMAL RAINFALL AS IT APPROACHED KYUSHU, AND NO EXTENSIVE DAMAGE REPORTS TO POPULATED AREAS WERE RECEIVED. THE POSSIBILITY OF SHIPPING DAMAGE EXISTS BUT IS UNKNOWN.


BEST TRACK
TYPHOON IDA
28–31 JULY 1961
31/00Z
31/18Z
30/00Z
29/00Z
28/06Z
TSINGTAO
SHANGHAI
TOKYO
CHICHI JIMA
ORINAVA
Legend
6 HR BEST TRACK POSITS
AIRCRAFT FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE

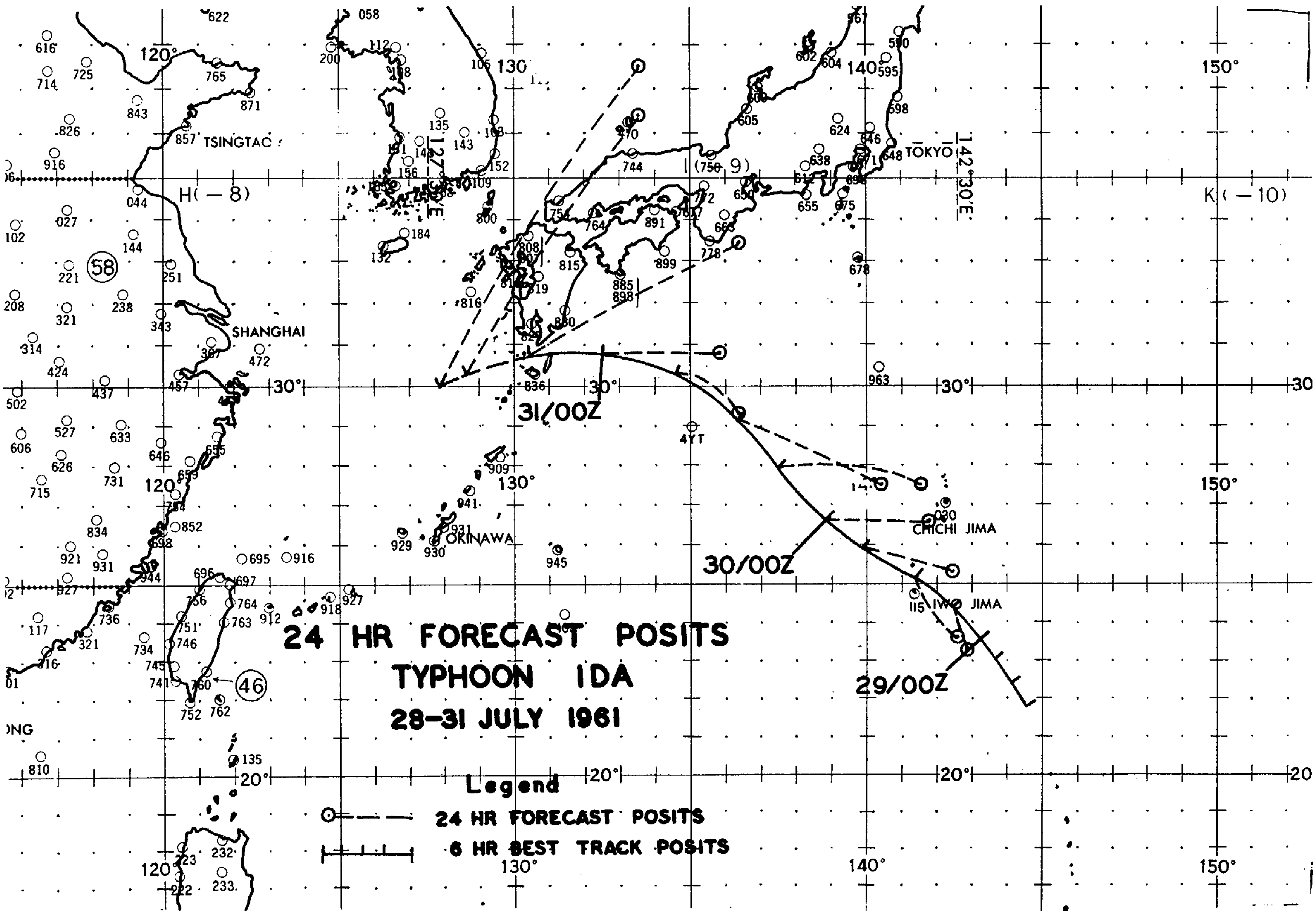
LAND RADAR AND AIRCRAFT FIXES - TYPHOON IDA

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/Td (°C)	EYE CHARACTERISTICS
1	282340Z	23.8N	143.4E	56-P-03	90	45	----	---	18/12	40MI DIA WALL CLDS WELL DVLPD
2	290800Z	24.4N	142.2E	56-P-00	70	70	9560	990	17/12	CIRC 25MI DIA OPEN NE
3	291620Z	25.5N	140.0E	VW1-R-10	---	---	----	---	-----	DIA 30MI
4	292135Z	26.1N	139.3E	56-P-05	80	70	9850	997	16/16	NOT DEFINED OPEN N
5	300251Z	27.5N	138.3E	56-P-07	95	---	9900	990	17/17	NOT DEFINED
6	300830Z	28.7N	136.8E	56-P-02	80	45	9950	992	17/09	NOT WELL DEFINED
7	301445Z	29.7N	135.5E	VW1-R-20	---	---	----	---	-----	POORLY DEFINED
8	302130Z	30.8N	133.3E	56-P-01	50	35	9960	993	15/09	POORLY DEFINED
9	310300Z	31.0N	131.6E	56-P-02	45	37	9940	992	14/09	POORLY DEFINED

TYPHOON IDA 28-31 JULY 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG. DISTANCE	48 HR. ERROR DEG. DISTANCE
280600Z	21.9N	144.5E	-------	-------
281200Z	22.5N	144.2E	-------	-------
281800Z	23.1N	143.8E	-------	-------
290000Z	23.7N	143.2E	-------	-------
290600Z	24.3N	142.4E	157-78	-------
291200Z	25.3N	141.3E	143-120	-------
291800Z	25.9N	139.9E	112-135	-------
300000Z	26.8N	138.7E	093-180	-------
300600Z	28.0N	137.4E	101-232	128-297
301200Z	29.3N	136.3E	117-247	128-358
301800Z	30.4N	134.7E	130-103	110-317
310000Z	30.9N	132.4E	089-195	092-390
310600Z	30.7N	130.4E	060-420	093-470
311200Z	30.3N	128.7E	031-485	081-530
311800Z	30.0N	128.0E	031-560	059-415

AVERAGE 24 HOUR ERROR 250 MI
AVERAGE 48 HOUR ERROR 397 MI


24 HR FORECAST POSITS
TYPHOON IDA
28-31 JULY 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
31/00Z
30/00Z
29/00Z
TSINGTAO
SHANGHAI
OKINAWA
CHICHI JIMA
IWO JIMA
TOKYO
H(−8)
K(−10)
120°
130°
140°
150°
30°
20°

H. TYPHOON JUNE (010600Z-081200Z AUGUST 1961)

AFTER THE DEPARTURE OF IDA FROM THE STAGE, WHILE HELEN WAS PERFORMING A LAST SCENE BY THE WINGS, JUNE APPEARED ON THE CENTER OF THE STAGE AS IF FROM MID AIR ON THE 301200Z SURFACE STREAMLINE CHART AS A CLOSED VORTEX NEAR 10N 141E. COMPARATIVELY LIGHT WINDS AROUND THE CYCLONE AND PREOCCUPATION WITH HELEN AND IDA CAUSED RECONNAISSANCE TO ARRIVE AFTER INTENSIFICATION COMMENCED, FOR THE RECONNAISSANCE AIRCRAFT REPORTED 50 KT WINDS AT 010430Z AND THE FIRST STORM WARNING ON JUNE WAS ISSUED AT 010600Z WITH 50 KT SURFACE WINDS NEAR THE CENTER.

JUNE PROGRESSED TO THE NW AT SPEEDS OF 6 TO 9 KTS AND INTENSIFIED TO TYPHOON STRENGTH AT 020000Z, HAD SURFACE WINDS OF 75 KTS BY 021800Z, THEN THE SURFACE WIND SPEEDS DECREASED BY 5 KTS 12 HOURS LATER. AT 041200Z THE SURFACE WIND SPEEDS DECREASED TO MINIMUM TYPHOON STRENGTH, REMAINED THERE FOR 12 HOURS THEN THE TYPHOON BEGAN A SLOW INTENSIFICATION OF SURFACE WIND SPEEDS TO 100 KTS BY 060600Z. THIS WEAKENING, THEN RE-INTENSIFICATION CORRESPONDS TO THE PARTIAL DISSIPATION OF THE WALL CLOUDS, THE RISE IN SURFACE PRESSURE AND 700 MB HEIGHT, AND THE DECREASE OF 700 MB TEMPERATURE ON 4 AUGUST. THE LAPSE RATE BETWEEN THE 700 MB LEVEL AND THE SURFACE INDICATED A SUBSTANTIAL COOLING AT ALL LEVELS WITH A MAXIMUM OF 7° TO 8° C FROM THE 860 TO THE 800 MB LEVEL BETWEEN 040900Z AND 042300Z. AN AVERAGE OF THE TEMPERATURE FOR EVERY 50 MB FROM THE SURFACE THROUGH 700 MB AT 040900Z INDICATED A TEMPERATURE OF 23.2° C AND A DEW POINT OF 16.6° C. AT 042300Z THE TEMPERATURE AVERAGE BY THE SAME METHOD WAS 19.0° C AND THE DEW POINT WAS 18.5° C. THE SOUNDING WARMED UP AGAIN AFTER 050400Z. THERE APPEARED TO BE SUBSTANTIAL SUBSIDENCE RESULTING IN A DRY LAPSE RATE FROM 763 TO 700 MB AT 040400Z, NO SUBSIDENCE AT 042300Z, THEN THE 060400Z SOUNDING INDICATED SUBSIDENCE TO BE WELL ESTABLISHED AND SUFFICIENT TO PRODUCE A DRY LAPSE RATE FROM 745 TO 700 MB.

JUNE PASSED 35 MI TO THE NE OF BATAN ISLAND AT 052200Z. THE U. S. COAST GUARD LORAN STATION AT BATAN PROVIDED SPECIAL OBSERVATIONS DURING THIS PERIOD, AND REPORTED A MINIMUM SEA LEVEL PRESSURE OF 996.7 MB, AND A SURFACE WIND OF ONLY 12 KTS WITH NO GUSTS, REVEALING THAT THE LEFT QUADRANT AND MOST OF THE LEFT SEMICIRCLE OF JUNE WAS VERY WEAK.

A WEAK SECONDARY LOW APPEARED IN THE TAIWAN STRAITS JUST W OF THE N TIP OF TAIWAN ON THE 060600Z SURFACE CHART. THIS CIRCULATION WAS NEVER WELL DEFINED NOR DID IT APPEAR TO HAVE PRESSURES BELOW 1000 MB OR SURFACE WINDS IN EXCESS OF 30 KTS WHILE A SECONDARY LOW. THE TYPHOON BEGAN WEAKENING AT 061200Z WHILE 40 MI FROM LAND AND ABOUT 65 MI FROM POINT OF PASSAGE OVER THE TAIWAN COAST. THE RUGGED TERRAIN OF THE ISLAND EFFECTIVELY DESTROYED THE WIND CIRCULATION. LEAVING ONLY A WEAK SKELETON OF JUNE BY THE TIME IT PASSED OVER THE COAST AT 070300Z WITH SURFACE WIND SPEEDS OF 50 KTS THAT QUICKLY REDUCED TO 25 KTS. JUNE MOVED INTO THE SECONDARY LOW ON THE W SIDE

OF TAIWAN BETWEEN 071200Z AND 071800Z. THE CYCLONE DEVELOPED 35 KT SURFACE WINDS WHILE OVER THE STRAITS OF TAIWAN, PASSED OVER THE COAST OF THE ASIATIC MAINLAND AT 080000Z, AND HAD WINDS OF ONLY 10 TO 15 KTS WITH A SURFACE PRESSURE OF SLIGHTLY LESS THAN 1000 MB IN THE CENTER WHEN THE LAST WARNING WAS ISSUED AT 081200Z.

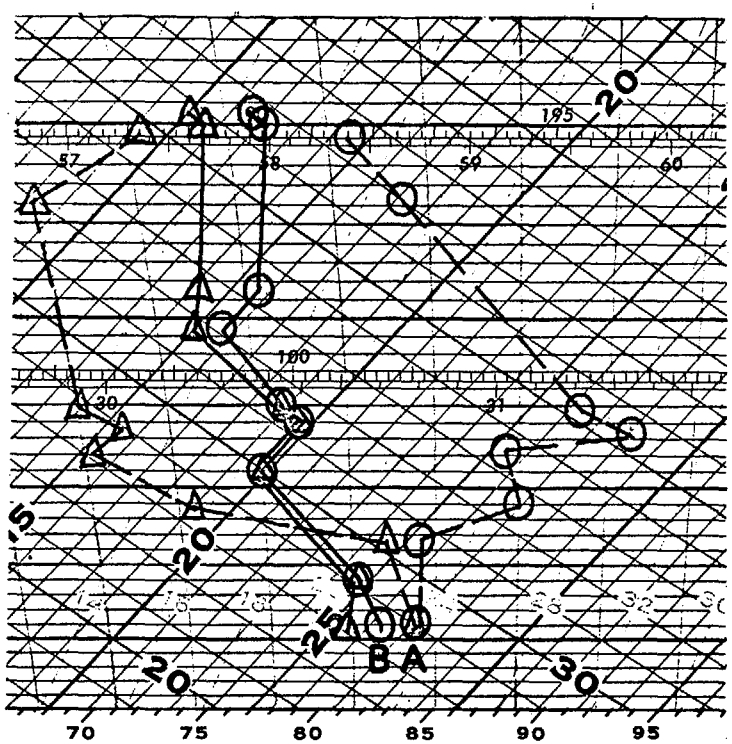
JUNE FORMED TO THE S OF THE RIDGE LINE WHICH WAS NEAR 30N AT THE 200 MB LEVEL. AN ANTICYCLONE AT THAT LEVEL WAS AT 10N 173E, JUST N OF MAJURO, WHICH EXTENDED AS FAR W AS GUAM. JUNE ALSO TRAVELED AROUND THE S AND SW SIDE OF A SURFACE ANTICYCLONE AS IT APPROACHED TAIWAN. THERE WAS EVIDENCE OF A CLOSED CYCLONIC CIRCULATION OVER JUNE ON 7-8 AUGUST TO AT LEAST 45,000 FT, BUT IT IS DIFFICULT TO SAY WITH ANY ASSURANCE THAT THIS CYCLONE WAS A DIRECT RESULT OF JUNE, OR WHETHER OTHER GENERAL CIRCULATION FACTORS WERE INVOLVED.

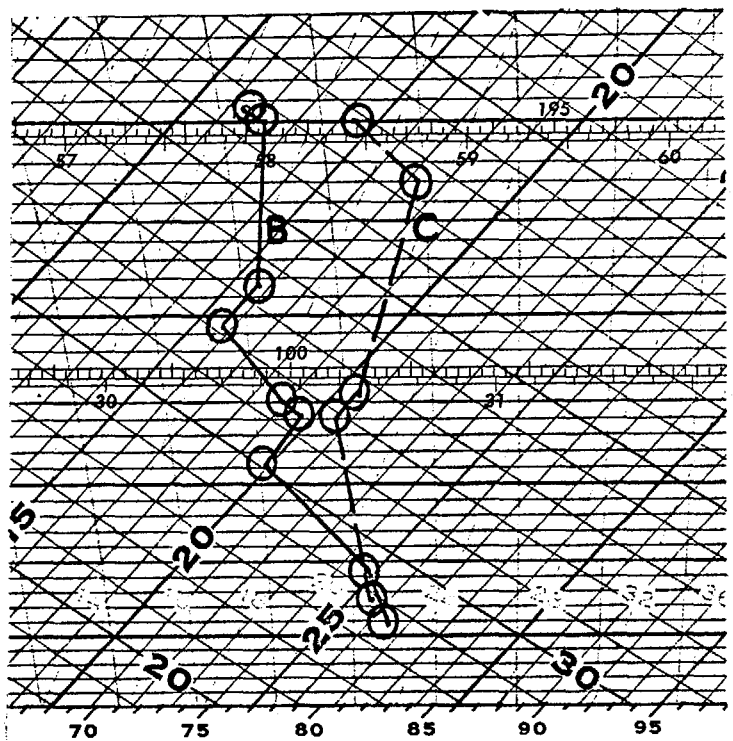
TWELVE LAND RADAR FIXES ON JUNE PROVIDED EXTREMELY ACCURATE POSITIONING OF THE TYPHOON DURING THE FEW HOURS PRIOR TO PASSING OVER THE COASTLINE OF TAIWAN.

NO GREAT DIFFICULTIES WERE INVOLVED IN FORECASTING. THE TYPHOON FOLLOWED THE SINGLE SPACE MEAN CHART REASONABLE WELL, BUT DID NOT FOLLOW THE 200 MB FLOW AFTER 3 AUGUST. THE TRACK MADE BY JUNE SATISFIES CLIMATOLOGY QUITE WELL, AND WITH THE EXCEPTION OF THE SHORT PERIOD OF WEAKENING ON 4 AUGUST VERY LITTLE OF AN UNUSUAL NATURE TRANSPIRED WORTHY OF EXCEPTIONAL NOTICE.

JUNE TRAVELED 1255 MI DURING THE 7 DAYS 6 HOURS THAT WARNINGS WERE ISSUED AT AN AVERAGE SPEED OF 173 MI PER DAY OR 7.2 KTS. THE SLOWEST SPEED OF TRAVEL WAS 3 KTS BETWEEN 061800Z AND 070000Z. THE FASTEST RATE OF TRAVEL WAS 11 KTS BETWEEN 071200Z AND 071800Z. THE HIGHEST SURFACE WINDS, 100 KTS, EXISTED BETWEEN 060600Z AND 061200Z.

THE TYPHOON DELIVERED THE FULL BRUNT OF ITS FORCE TO TAIWAN AND ORCHID ISLAND, JUST E OF THE S TIP OF TAIWAN. DAMAGE IS UNKNOWN ON ORCHID ISLAND, HOWEVER THE TYPHOON PASSED DIRECTLY OVER IT. JUNE DUMPED 21.6 INCHES OF RAIN ON SOUTHERN TAIWAN, TWENTY PERSONS WERE REPORTED DEAD IN THE KAOHSIUNG-TAITUNG AREA, AND ABOUT 15,000 PEOPLE WERE LEFT HOMELESS. ABOUT 5,000 ACRES OF LAND WERE FLOODED ALONG THE LOVE RIVER WHICH OVERFLOWED ITS BANKS. LANDSLIDES BLOCKED HIGHWAYS BETWEEN TAITUNG AND HUALIEN. ABOUT 30 PERCENT OF THE TELEPHONES AT KAOHSIUNG WERE OUT OF ORDER AND TWO SMALL FACTORIES COLLAPSED UNDER THE FORCE OF WINDS AND RAIN. THE CITY OF KAOHSIUNG, HEAVIEST HIT ON TAIWAN WHEN THE LOVE RIVER OVERFLOWED, WAS DECLARED AN EMERGENCY AREA AND NATIONALIST CHINESE TROOPS PERFORMED RESCUE WORK THERE.





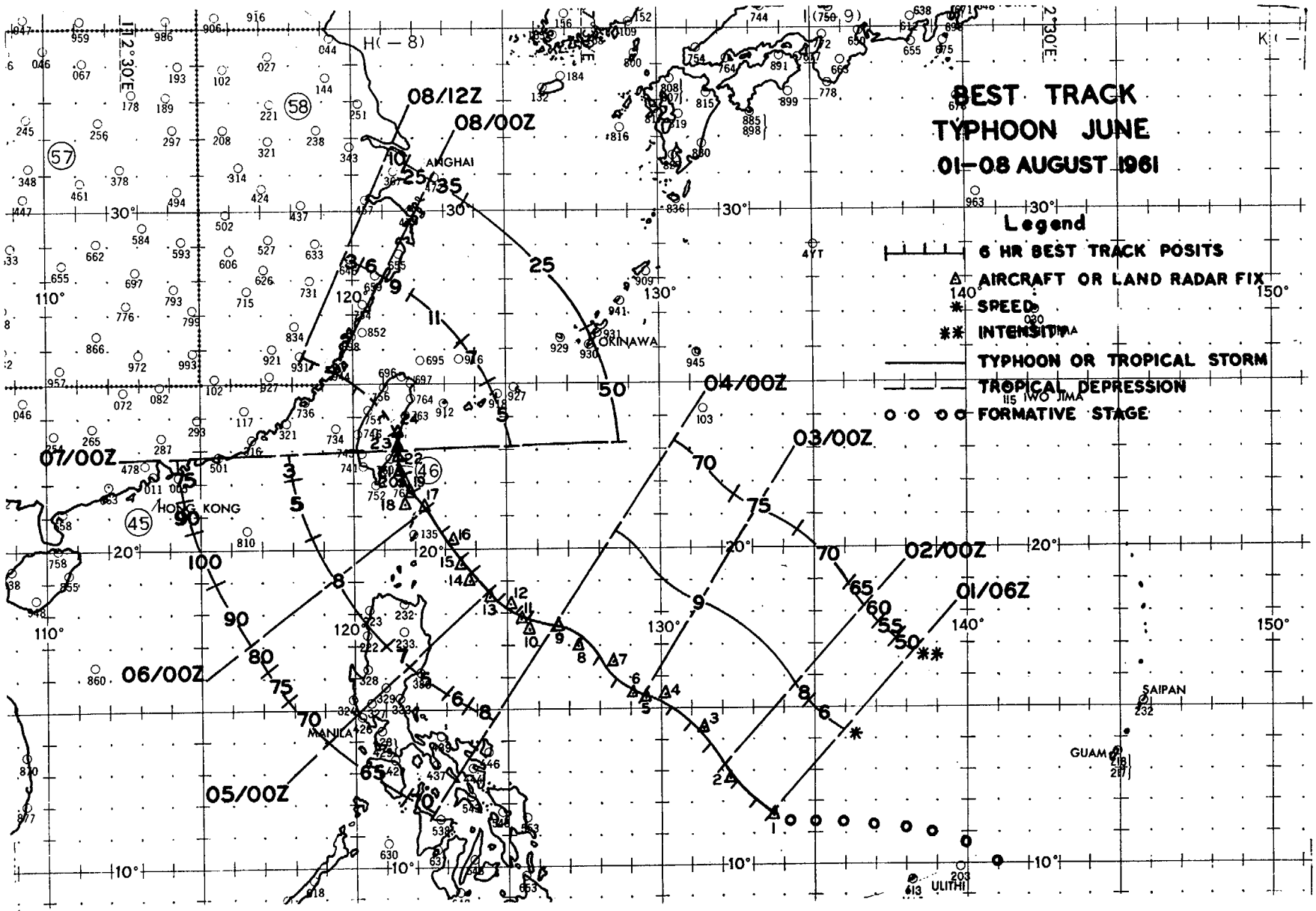
SOUNDING A(DASHED) 040900Z, T AND T_D

SOUNDING B(SOLID) 042300Z, T AND T_D

NOTE: THE 850MB LEVEL, SOUNDING B HAS A θ_E THAT IS 4°C WARMER THAN THE CORRESPONDING LEVEL FOR SOUNDING A.

SOUNDING B(SOLID) 042300Z, T ONLY

SOUNDING C(DASHED) 050930Z, T ONLY


BEST TRACK
TYPHOON JUNE
01–08 AUGUST 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT OR LAND RADAR FIX
* SPEED
** INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
08/12Z
08/00Z
04/00Z
03/00Z
02/00Z
01/06Z
01/00Z
06/00Z
05/00Z
SHANGHAI
OKINAWA
HONG KONG
MANILA
SAIPAN
GUAM
ULITHI
IWO JIMA
112°30'E
110°
120°
130°
140°
150°
10°
20°
30°

LAND RADAR AND AIRCRAFT FIXES - TYPHOON JUNE

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
1	010430Z	11.7N	133.8E	VW1-P-05	50	---	-----	990	------	DIA 45MI OPEN N-E
2	012200Z	12.9N	132.3E	56-P-10	60	50	10000	992	12/09	----------
3	020900Z	14.3N	131.4E	56-P-05	80	55	9960	987	15/07	CIRC 20MI DIA
4	021530Z	15.3N	130.1E	VW1-P-10	50	---	-----	988	15/09	DIA 35MI OPEN N-E
5	022200Z	15.3N	129.6E	56-P-10	110	60	10090	988	15/09	----------
6	030130Z	15.4N	129.1E	56-P-10	110	60	9980	984	15/11	----------
7	030830Z	16.4N	128.4E	56-P-05	100	60	10060	998	14/03	CIRC 20MI DIA WALL CLD SW
8	031630Z	17.0N	127.3E	VW1-R-U	---	---	-----	---	------	NO DEFINITE EYE DIA 50MI
9	032200Z	17.6N	126.8E	56-P-05	70	50	10030	995	14/09	75MI DIA OPEN N & NE
10	040330Z	17.5N	125.8E	56-P-02	85	50	9980	990	15/00	OPEN N & NE
11	040845Z	17.9N	125.6E	56-P-02	100	35	10030	993	14/10	CIRC DIA 65MI OPEN N
12	041540Z	18.1N	125.2E	VW1-R-10	---	---	-----	---	------	ELLIP NW-SE AXIS 35MI LONG
13	042230Z	18.5N	124.5E	56-P-02	90	50	9900	993	12/11	CIRC 35MI DIA WALL CLDS ALL QUADS
14	050400Z	19.0N	123.9E	56-P-02	95	65	9800	988	13/11	CIRC DIA 35MI
15	050930Z	19.4N	123.5E	56-P-06	80	70	9610	981	15/05	CIRC DIA 25MI
16	051530Z	20.2N	123.2E	VW1-R-05	---	---	-----	---	------	DIA 30MI
17	052300Z	21.2N	122.3E	56-P-03	65	50	9420	973	16/08	CIRC 20MI DIA WELL DEFINED WALL CLDS
18	060150Z	21.3N	121.9E	56-P-01	100	70	9250	---	12/12	CIRC 20MI DIA
19	060400Z	21.5N	121.9E	56-P-03	100	75	9230	964	17/07	CIRC 10MI DIA
20	060845Z	22.0N	121.8E	56-P-05	100	100	9120	961	16/06	WELL DEFINED CIRC 25MI DIA
21	061200Z	22.2N	121.6E	LND/RDR	---	---	-----	---	------	----------

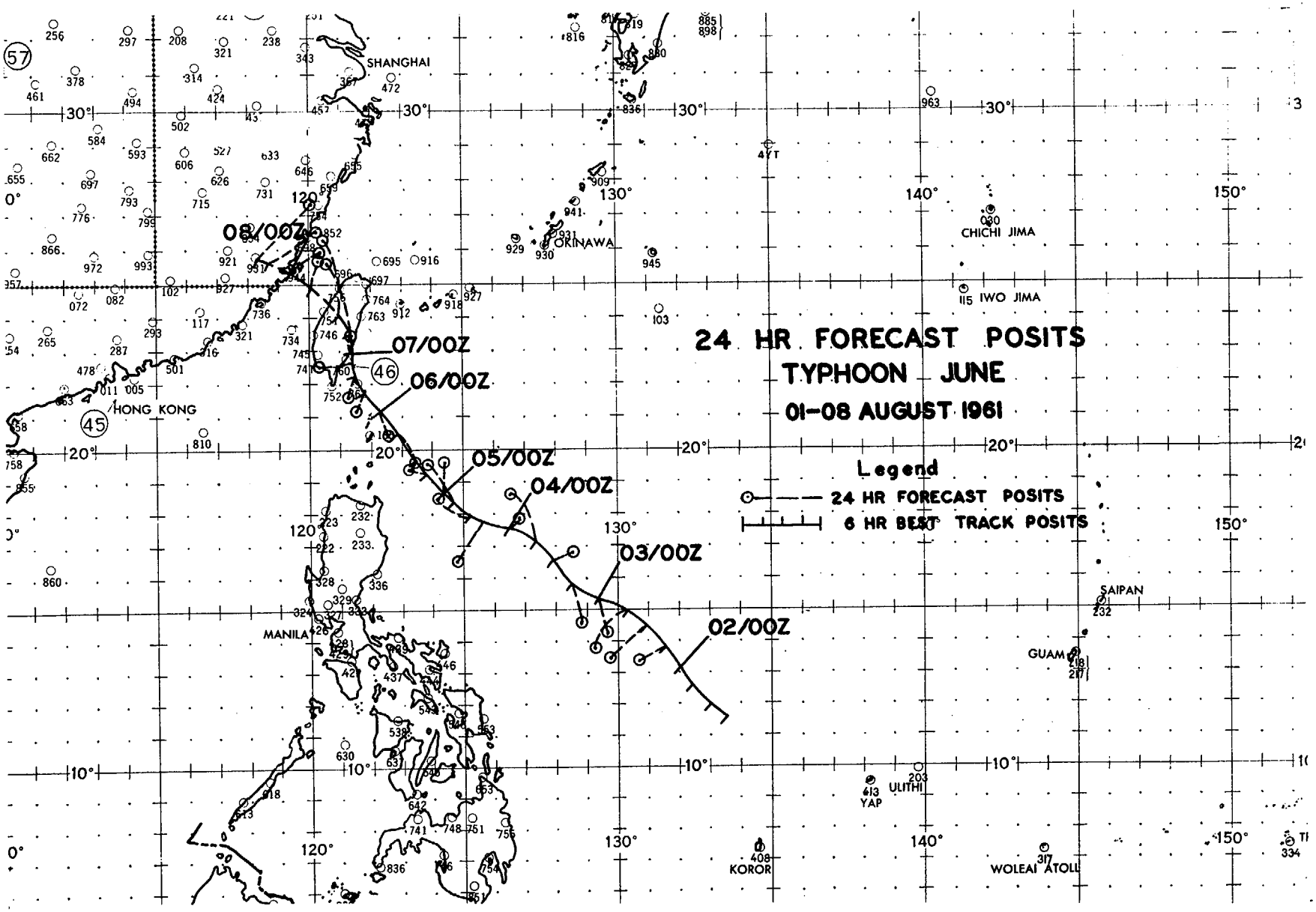
LAND RADAR AND AIRCRAFT FIXES - TYPHOON JUNE (CONT'D)

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/Td (°C)	EYE CHARACTERISTICS
22	061800Z	22.7N	121.5E	LND/RDR	---	---	----	---	-----	----------
23	070000Z	23.0N	121.5E	LND/RDR	---	---	----	---	-----	----------
24	070600Z	23.4N	121.4E	LND/RDR	---	---	----	---	-----	----------

TYPHOON JUNE 01-08 AUG 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG. DISTANCE	48 HR. ERROR DEG. DISTANCE
010600Z	11.8N	133.6E	-------	-------
011200Z	12.1N	133.1E	-------	-------
011800Z	12.5N	132.6E	-------	-------
020000Z	13.1N	132.2E	-------	-------
020600Z	13.9N	131.7E	238-73	-------
021200Z	14.6N	131.0E	224-89	-------
021800Z	15.0N	130.2E	189-87	-------
030000Z	15.4N	129.3E	158-76	-------
030600Z	15.8N	128.5E	159-72	232-120
031200Z	16.6N	128.0E	049-33	231-148
031800Z	17.3N	127.5E	327-93	226-167
040000Z	17.6N	126.5E	047-31	168-128
040600Z	17.7N	125.7E	215-91	189-107
041200Z	18.0N	125.3E	300-69	214-84
041800Z	18.3N	124.8E	325-90	341-205
050000Z	18.6N	124.4E	003-53	005-133
050600Z	19.2N	123.9E	281-43	089-56
051200Z	19.8N	123.4E	211-37	096-103
051800Z	20.5N	122.9E	330-63	111-96
060000Z	21.1N	122.3E	157-50	055-54
060600Z	21.7N	121.8E	187-35	209-120
061200Z	22.2N	121.6E	193-98	189-145
061800Z	22.7N	121.5E	255-75	206-78
070000Z	23.0N	121.5E	333-25	229-74
070600Z	23.5N	121.4E	340-129	085-126
071200Z	24.2N	121.2E	338-151	072-125
071800Z	24.8N	120.0E	015-58	288-150
080000Z	25.1N	119.2E	049-76	033-159
080600Z	25.4N	118.6E	048-108	015-310
081200Z	25.6N	118.4E	045-130	015-337

AVERAGE 24 HOUR ERROR 74 MI
AVERAGE 48 HOUR ERROR 138 MI


24 HR FORECAST POSITS
TYPHOON JUNE
01-08 AUGUST 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
08/00Z
07/00Z
06/00Z
05/00Z
04/00Z
03/00Z
02/00Z
SHANGHAI
HONG KONG
MANILA
OKINAWA
CHICHI JIMA
IWO JIMA
SAIPAN
GUAM
YAP
ULITHI
KOROR
WOLEAI ATOLL
120°
130°
140°
150°
30°
20°
10°
0°

I. TYPHOON KATHY (151000Z-180600Z AUGUST 1961)

THE FIRST KNOWN OBSERVATION OF KATHY WAS MADE BY A USAF WEATHER OFFICER, ANDERSEN AFB, WHO WAS FLYING AS NAVIGATOR ON A C-54 ENROUTE TO JAPAN FROM GUAM. HE SENT THE FOLLOWING REPORT TO JTWC: "SPECIAL WX REPORT X 2340N 14240E VERY LARGE TSTMS X 50 NM IN DIAMETER SFC WIND EST 40 KTS L/V TURBULENCE." THE REPORT ARRIVED AT 150320Z; THE SITUATION WAS EXAMINED AND THE INFORMATION WAS INTERPRETED TO BE WEATHER CONDITIONS ASSOCIATED WITH TROPICAL DEPRESSION 20, THEN CENTERED NEAR 18.5N 139.5E. THE SIGNIFICANCE OF THE REPORT WAS REALIZED WHEN IWO JIMA REPORTED STRONG WINDS AND A PRESSURE OF 998.6 MB AT 150600Z. THIS REPORT WAS VERY LATE IN ARRIVING, ALLOWING KATHY TO PASS IWO JIMA BEFORE JTWC BECAME AWARE OF THE CONDITIONS THERE. KATHY WAS ACTUALLY TRAVELING AROUND TROPICAL DEPRESSION 20.

THE MINIMUM PRESSURE REPORTED AT IWO JIMA WAS 997.0 MB AT 150730Z, WITH MAXIMUM SUSTAINED WINDS OF 42 KTS AND MAXIMUM RECORDED GUSTS OF 61 KTS, HOWEVER THE GUSTS EXCEEDED THIS VALUE AT A LATER TIME BUT POWER FAILURE PRECLUDED RECORDING THE VALUE.

THE FIRST WARNING WAS ISSUED ON KATHY AT 151000Z AS A STORM. THE CIRCULATION CONTINUED TO INTENSIFY UNTIL WINDS OF TYPHOON STRENGTH WERE AROUND IT AFTER 151800Z. AS IT APPROACHED KYUSHU, THE LAND EFFECT DISRUPTED THE ASSOCIATED WIND FIELD AFTER 170600Z. THE SURFACE WIND SPEEDS THEN DECREASED IN INTENSITY FROM 80 KTS TO 60 KTS AND WERE ONLY 25 KTS NEAR THE CENTER AS KATHY PASSED OVER THE KYUSHU COAST LINE SHORTLY AFTER 171800Z. THE LAST WARNING WAS ISSUED AT 180600Z WHILE KATHY WAS OVER THE ISLAND OF KYUSHU.

KATHY REMAINED VERY SMALL IN SIZE THROUGHOUT ITS LIFE. THE LAST CLOSED ISOBAR PROBABLY DID NOT EXCEED 450 MI IN DIAMETER AT ANY TIME NOR DID THE RADIUS OF 30 KT WINDS EXTEND BEYOND A 150 MI RADIUS. THE SMALL SIZE CREATED ANALYSIS DIFFICULTIES, EVEN AS IT APPROACHED LAND.

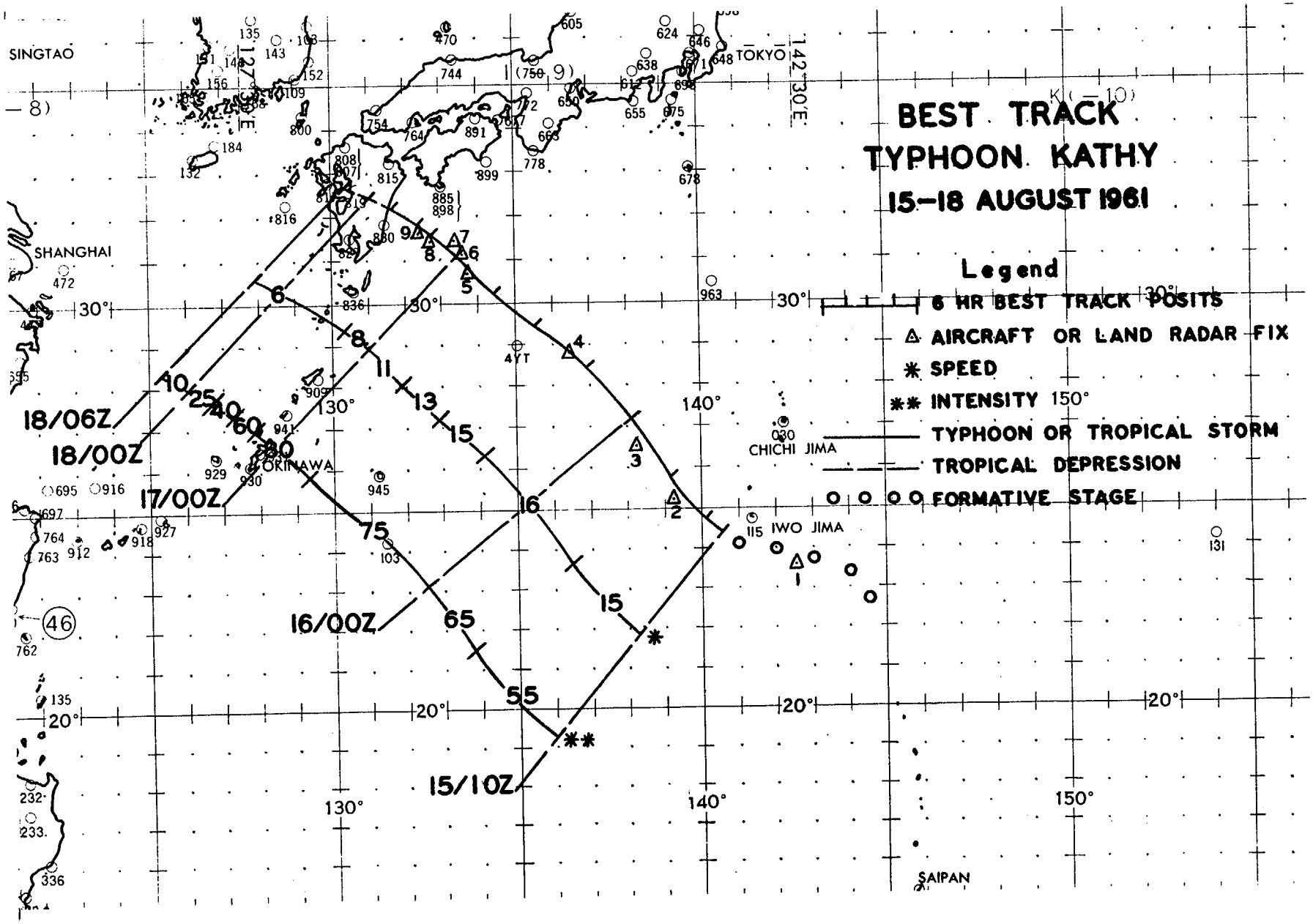
THE TRACK OF KATHY APPROXIMATELY PARALLELED THE 700 MB FLOW, AND WAS ALSO TO THE S THEN SW OF A 500 MB ANTI-CYCLONE THAT MOVED WESTWARD SLIGHTLY DURING THE LIFE CYCLE OF THE TYPHOON. THE 500 MB AND 200 MB RIDGE LINES WERE BETWEEN 33N AND 35N AT THIS TIME. THE WIND FLOW AT THE 200 MB LEVEL COULD NOT BE USED FOR MORE THAN A GENERAL GUIDE TO THE DIRECTION OF MOVEMENT OF THE TYPHOON. A FORECAST USING THESE WINDS WOULD HAVE PREDICTED THE TYPHOON TO MOVE N. THE SINGLE SPACE MEAN CHART WAS AN EXCELLENT TOOL TO FORECAST THE DIRECTION OF TYPHOON MOVEMENT. THE TRACK OF KATHY WAS SIMILAR TO THAT OF IDA OF ONLY A FEW DAYS BEFORE, GEORGIA OF 1955, ALSO FLOSSIE AND HELENE OF 1950 IN BOTH POSITION AND DIRECTION OF MOVEMENT. THIS TYPE OF TRACK IS NOT UNUSUAL BUT IS RELATIVELY RARE.

KATHY MOVED FASTER THAN WAS FORECAST ON THE FIRST FEW WARNINGS. THE TYPHOON CONTINUED ON A NW TRACK AND SLOWED DOWN, BUT THE WARNINGS

ON THE 17TH AND 18TH FORECAST IT TO MOVE MORE NNW AT A FASTER RATE OF MOVEMENT. THE 48 HOUR OUTLOOK WAS ON AN AVERAGE ONLY 164 MI IN ERROR WHILE THE 24 HOUR FORECAST WAS 180 MI IN ERROR. THE MILLER-MOORE 24 HOUR FORECASTS WERE MORE ACCURATE THAN THE WARNING FORECASTS.

KATHY TRAVELED 740 MI DURING THE 2 DAYS AND 20 HOURS THAT WARNINGS WERE ISSUED AT THE RATE OF 261 MI PER DAY, OR AT AN AVERAGE SPEED OF 10.9 KTS. THE TYPHOON MOVED AT A MINIMUM SPEED OF 6 KTS BETWEEN 170600Z AND 180600Z AND AT A MAXIMUM RATE OF SPEED OF 16 KTS BETWEEN 151800Z AND 160600Z. KATHY HAD A MAXIMUM OF 80 KT SURFACE WINDS BETWEEN 161800Z AND 170600Z.

DAMAGE REPORTS WERE NOT RECEIVED BY JTWC, HOWEVER POSSIBLE DAMAGE COULD HAVE OCCURRED TO SHIPPING. THE HIGH WINDS ASSOCIATED WITH KATHY DID CREATE A POWER OUTAGE ON IWO JIMA AS IT PASSED THAT ISLAND, AND OTHER DAMAGE MAY HAVE OCCURRED.


BEST TRACK
TYPHOON KATHY
15–18 AUGUST 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT OR LAND RADAR FIX
SPEED
INTENSITY 150°
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
SINGTAO
SHANGHAI
TOKYO
CHICHI JIMA
IWO JIMA
OKINAWA
SAIPAN
18/06Z
18/00Z
17/00Z
16/00Z
15/10Z
142°30'E
127°E
30°
140°
130°
150°
20°

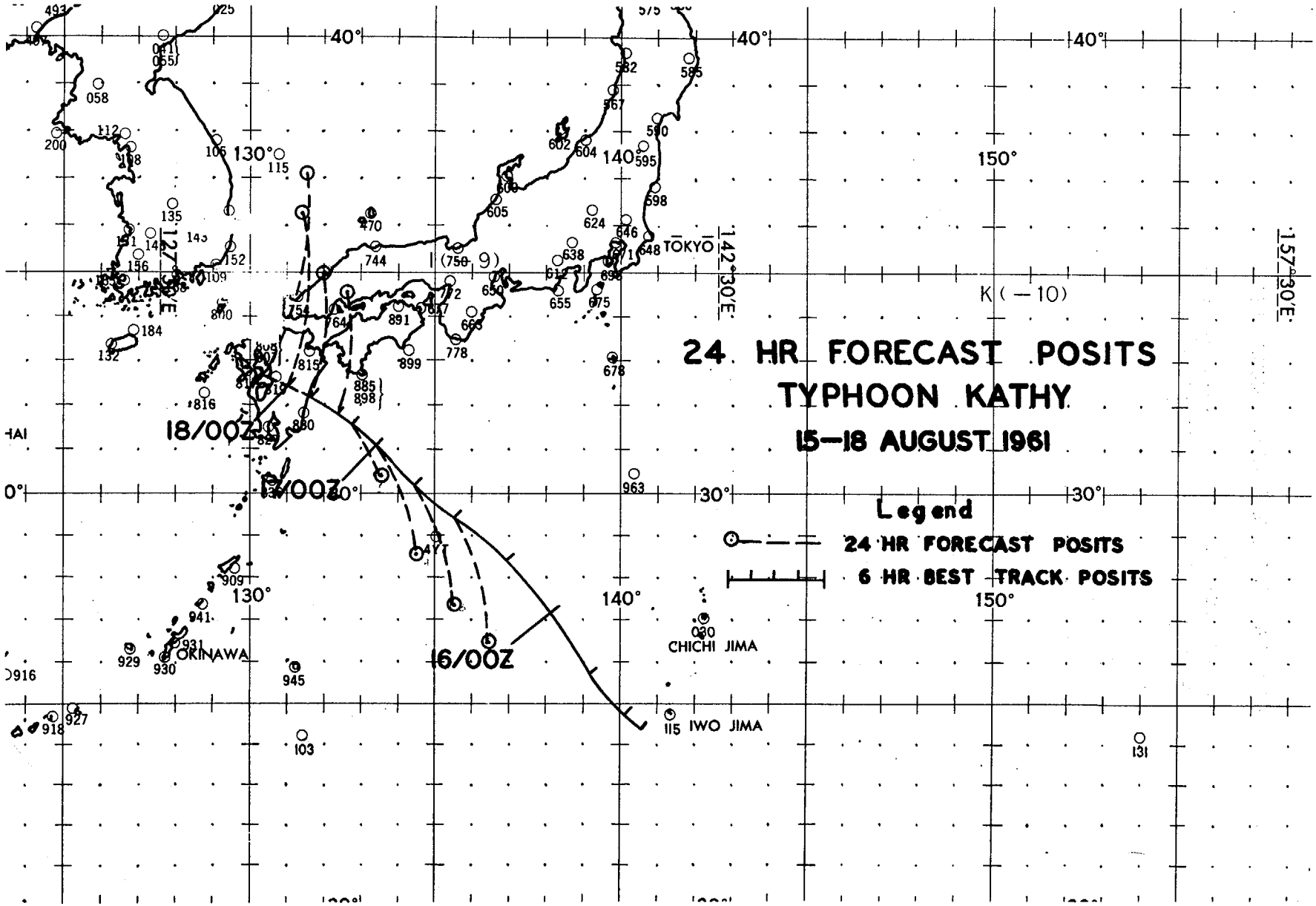
LAND RADAR AND AIRCRAFT FIXES - TYPHOON KATHY

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
1	150300Z	23.7N	142.7E	USAF-P-U	40	---	----	---	-----	50MI DIA
2	151938Z	25.3N	139.2E	VW1-P-30	---	30	10544	---	13/--	NO WALL CLDS
3	152230Z	26.6N	138.2E	56-P-05	15	14	10190	986	11/10	DIFFUSED NO WALL CLDS
4	160830Z	28.9N	136.4E	56-P-03	80	40	9940	986	18/--	OPEN S WELL DEFINED
5	162130Z	30.8N	133.8E	56-P-04	110	60	9930	980	17/11	CIRC DIA 20MI OPEN S
6	170020Z	31.1N	133.6E	56-P-04	100	60	----	1000	18/--	CIRC 40MI DIA
7	170200Z	31.4N	133.3E	56-P-10	85	55	9890	988	20/14	CIRC 40MI DIA
8	170600Z	31.5N	132.8E	LND/RDR	---	---	----	---	-----	----------
9	170900Z	31.7N	132.3E	LND/RDR	---	---	----	---	-----	----------

TYPHOON KATHY 15-18 AUG 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG. DISTANCE	48 HR. ERROR DEG. DISTANCE
151000Z	24.6N	140.7E	-------	-------
151200Z	24.8N	140.2E	-------	-------
151800Z	25.9N	139.1E	-------	-------
160000Z	27.2N	138.1E	-------	-------
160600Z	28.4N	136.9E	-------	-------
161200Z	29.4N	135.6E	160-175	-------
161800Z	30.2N	134.3E	160-184	-------
170000Z	31.1N	133.7E	164-154	-------
170600Z	31.5N	132.8E	155-78	-------
171200Z	31.8N	132.2E	013-167	180-263
171800Z	32.2N	131.7E	005-176	180-244
180000Z	32.4N	131.0E	005-232	163-109
180600Z	32.7N	130.3E	010-275	017-40

AVERAGE 24 HOUR ERROR 180 MI
AVERAGE 48 HOUR ERROR 164 MI


24 HR FORECAST POSITS
TYPHOON KATHY
15–18 AUGUST 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
18/00Z
17/00Z
16/00Z
OKINAWA
CHICHI JIMA
IWO JIMA
TOKYO
K (–10)
40°
30°
130°
140°
150°
142°30'E
157°30'E

J. TYPHOON LORNA (201200Z-261200Z AUGUST 1961)

SEVERAL DAYS BEFORE THE FIRST WARNING WAS ISSUED ON LORNA (201200Z) A CONFUSION OF WEAK VORTICES EXISTED OVER THE SOUTH CHINA SEA AND THE PHILIPPINE SEA. THE SURFACE PRESSURE GRADIENT WAS RELATIVELY FLAT THROUGHOUT THE AREA. EASTERLIES PERSISTED OVER THE ENTIRE PHILIPPINE SEA AND EQUATORIAL WESTERLIES EXTENDED ACROSS INDO-CHINA AND THE PHILIPPINES TOWARD GUAM FROM THE EQUATOR TO 15N. THIS CONDITION BEGAN TO MODIFY RAPIDLY ON 19 AUGUST AND THE 200000Z SURFACE CHART DEPICTED THREE SIZEABLE CYCLONES, ONE IN THE SOUTH CHINA SEA, ANOTHER JUST E OF THE PHILIPPINES NEAR 15N 131E THAT BECAME LORNA, WITH A THIRD CYCLONE SITUATED QUITE CLOSE TO GUAM.

WEATHER RECONNAISSANCE AIRCRAFT THAT INVESTIGATED THE CENTER DID NOT INDICATE A WELL ORGANIZED SYSTEM ON THE 19TH, HOWEVER THE FIX MADE ON 20 AUGUST REPORTED 30 KT SURFACE WINDS NEAR THE CENTER WITH AN ORGANIZED CLOUD AND PRESSURE SYSTEM, THUS THE FIRST WARNING WAS ISSUED ON LORNA AS A TROPICAL DEPRESSION WITH 30 KT SURFACE WINDS. THE CYCLONE INTENSIFIED AT THE RATE OF 10 KTS PER 6 HOURS, BECAME A TYPHOON AT 210600Z, CHANGED DIRECTION FROM NW TO W THEN SW, AND LOOPED WITHIN 48 HOURS OF THE FIRST WARNING. THE LOOP WAS ABOUT 25 MI IN DIAMETER, OCCURRING BETWEEN 212100Z AND 221200Z AT AN AVERAGE SPEED OF 4 KTS. THE SURFACE WINDS AROUND THE TYPHOON INCREASED IN SPEED FROM 75 TO 90 KTS DURING THE LOOP AND CONTINUED TO INTENSIFY TO A MAXIMUM OF 120 KTS AS IT MOVED NW TOWARD TAIWAN. LORNA PASSED 45 MI NE OF BATAN ISLAND AT 241030Z, CAUSED THE PRESSURE TO FALL TO A MINIMUM OF 981.9 MB AND CREATED WINDS OF 40 KTS WITH GUSTS TO 65 KTS.

LORNA BEGAN WEAKENING AFTER 241200Z AND BY THE TIME IT PASSED OVER THE COASTLINE OF TAIWAN AT 242200Z THE SURFACE WINDS HAD REDUCED TO 90 KTS. THE TERRAIN EFFECT FURTHER REDUCED THE SURFACE WINDS TO 40 KTS WHILE OVER LAND. AFTER THE TYPHOON PASSED INTO THE STRAITS OF TAIWAN AT 250300Z, THE SURFACE WINDS INCREASED TO 50 KTS. THE TYPHOON MOVED INLAND THIS TIME OVER THE ASIATIC MAINLAND AT 252100Z WITH SURFACE WINDS OF ONLY 35 KTS. THE CIRCULATION QUICKLY DISSIPATED, PRODUCING SURFACE WINDS OF ONLY 20 KTS BY THE TIME OF THE FINAL WARNING AT 261200Z.

LORNA DID NOT FOLLOW ANY FLOW PATTERN THAT WAS DEPICTED BY THE STANDARD LEVEL CHARTS, NOR DID THE SPACE MEAN FLOW PATTERN SATISFY THE COMMON DEFINITION OF A "STEERING" CHART. THE 500 MB RIDGE LINE WAS AT ABOUT 31N, THAT OF THE 200 MB WAS ABOUT 1 DEGREE FURTHER N, WITH THE 700 MB RIDGE LINE FALLING UNDER THAT OF THE 500 MB CHART. LORNA FORMED UNDER THE MIDDLE OF THREE CYCLONES EXISTING IN THE E-W TROUGH ON THE 500 MB CHART; THE DESCRIPTION OF WHICH IS SATISFIED BY THE DISCUSSION OF THE 200000Z SURFACE CHART IN THE INITIAL PARAGRAPH. AN ANTICYCLONE THAT WAS NEAR SHANGHAI ON THE 500 MB AND 200 MB CHARTS, WHEN WARNINGS WERE FIRST ISSUED ON LORNA, MOVED TO THE VICINITY OF TOKYO BY THE TIME OF THE LAST WARNING. THE UPPER AIR CIRCULATION WAS AFFECTED AT LEAST THROUGH THE 40,000 FT LEVEL BETWEEN

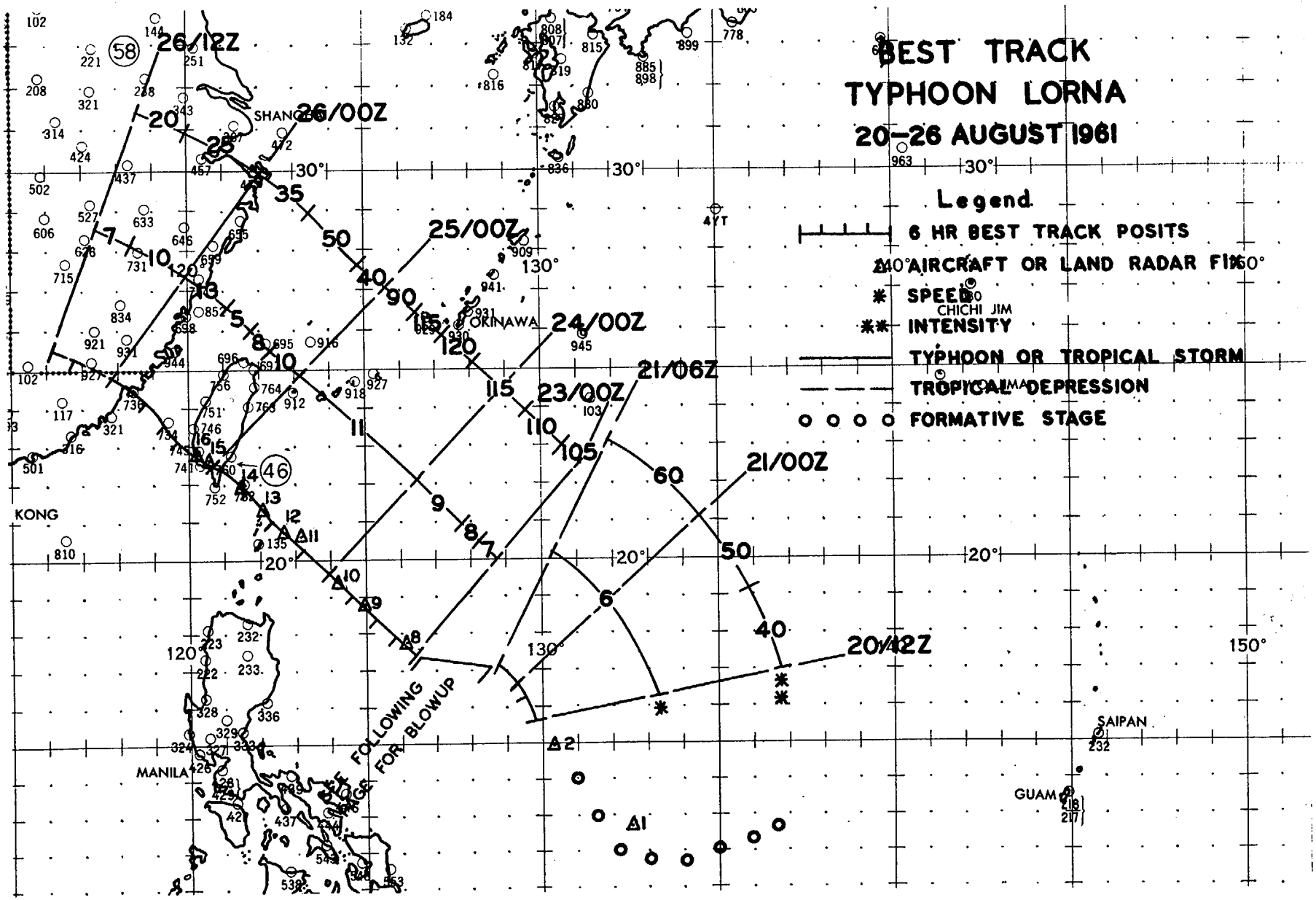
241200Z AND 251200Z.

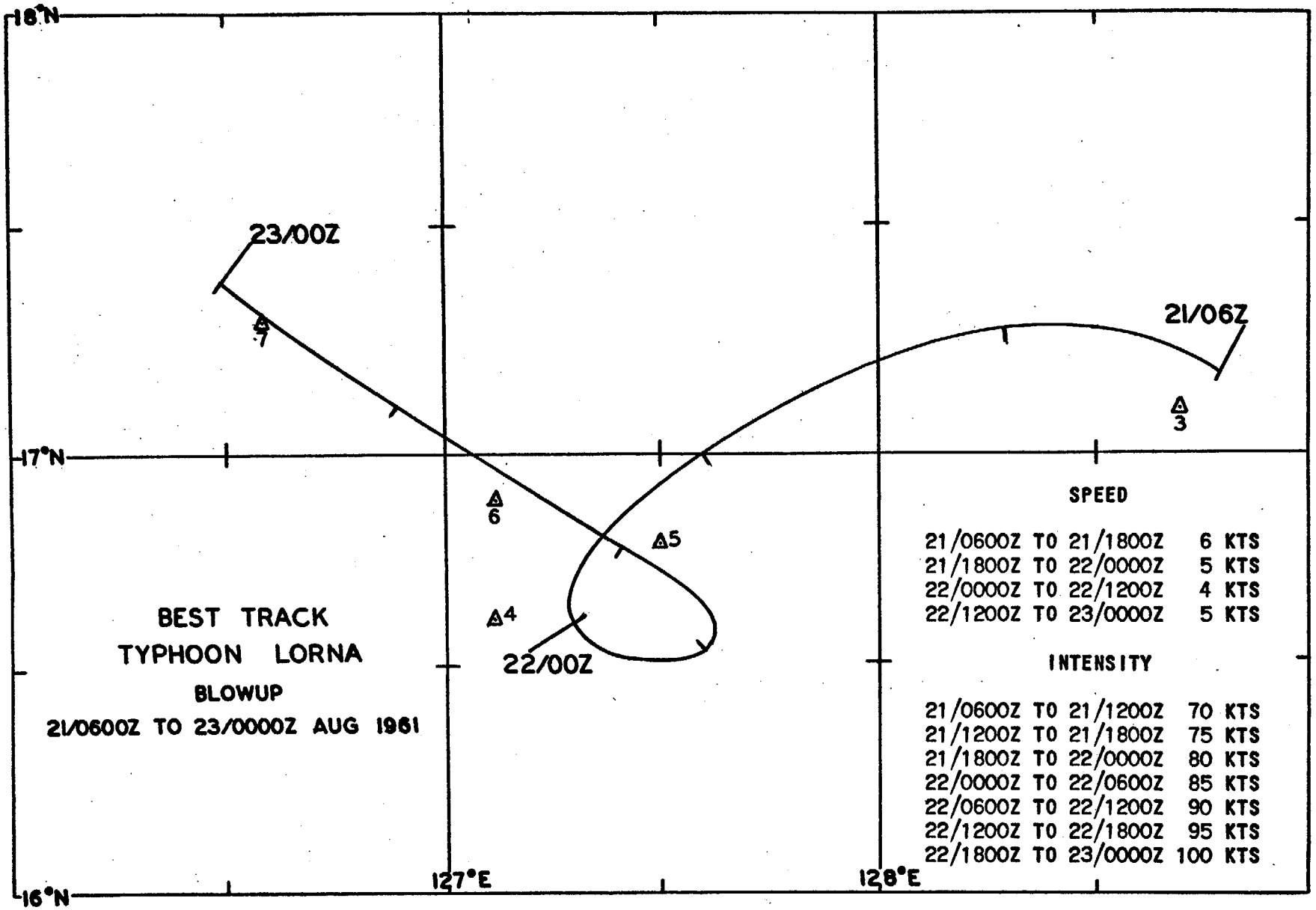
THE 1002 MB ISOBAR (LAST CLOSED ONE AT THE PEAK OF LORNA'S SIZE) ENCLOSED ABOUT 950,000 SQ MI. LORNA WAS A LARGE TYPHOON, BUT NOT THE LARGEST OF THE YEAR.

LORNA TRAVELED 1100 MI DURING THE 6 DAYS THAT WARNINGS WERE ISSUED AT AN AVERAGE SPEED OF 7.6 KTS OR 183 MI PER DAY; IT TRAVELED AT A MINIMUM SPEED OF 4 KTS BETWEEN 220000Z AND 221200Z AND AT A MAXIMUM SPEED OF 11 KTS BETWEEN 240000Z AND 250000Z. THE TYPHOON WAS AT ITS MAXIMUM INTENSITY, PRODUCING SURFACE WINDS OF 120 KTS BETWEEN 240600Z AND 241200Z.

WITH THE EXCEPTION OF THE LOOP, LORNA DID NOT CREATE ANY UNUSUAL FORECAST PROBLEMS.

LIMITED INFORMATION INDICATES THAT MAJOR FLOOD DAMAGE OCCURRED TO VILLAGES AND CROPS WITH THREE PERSONS KNOWN DEAD ON TAIWAN. REPORTS WERE NOT AVAILABLE FOR THE ASIATIC MAINLAND.


BEST TRACK
TYPHOON LORNA
20–26 AUGUST 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT OR LAND RADAR FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
26/12Z
26/00Z
25/00Z
24/00Z
23/00Z
21/06Z
21/00Z
20/12Z
SHANGHAI
OKINAWA
CHICHI JIM
IWO JIMA
4YT
KONG
MANILA
SAIPAN
GUAM
FOLLOWING FOR BLOWUP
120°
130°
140°
150°
30°
20°


18°N
17°N
16°N
127°E
128°E
23/00Z
21/06Z
22/00Z
Δ7
Δ6
Δ5
Δ4
Δ3
BEST TRACK
TYPHOON LORNA
BLOWUP
21/0600Z TO 23/0000Z AUG 1961
SPEED
21/0600Z TO 21/1800Z 6 KTS
21/1800Z TO 22/0000Z 5 KTS
22/0000Z TO 22/1200Z 4 KTS
22/1200Z TO 23/0000Z 5 KTS
INTENSITY
21/0600Z TO 21/1200Z 70 KTS
21/1200Z TO 21/1800Z 75 KTS
21/1800Z TO 22/0000Z 80 KTS
22/0000Z TO 22/0600Z 85 KTS
22/0600Z TO 22/1200Z 90 KTS
22/1200Z TO 22/1800Z 95 KTS
22/1800Z TO 23/0000Z 100 KTS

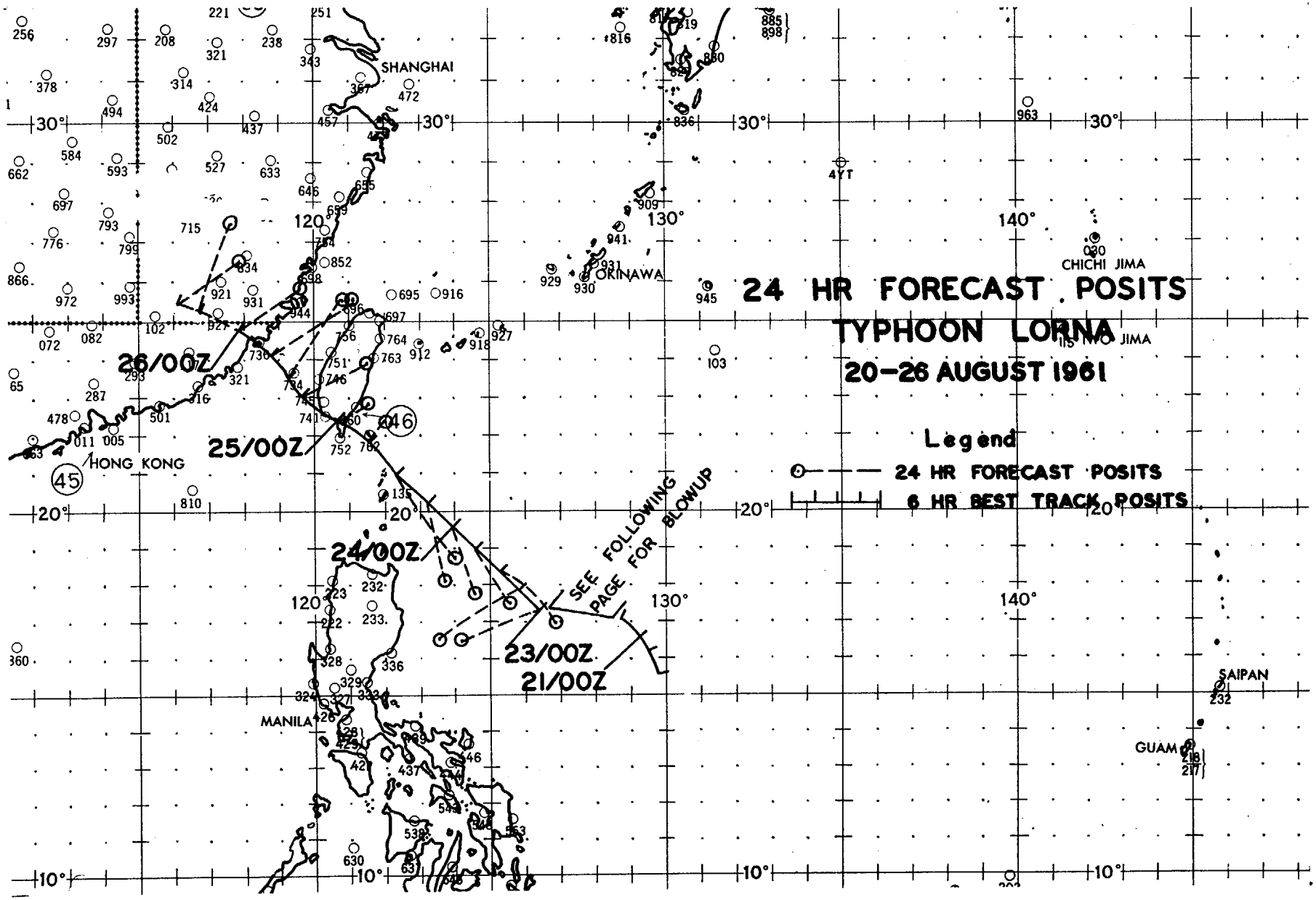
LAND RADAR AND AIRCRAFT FIXES - TYPHOON LORNA

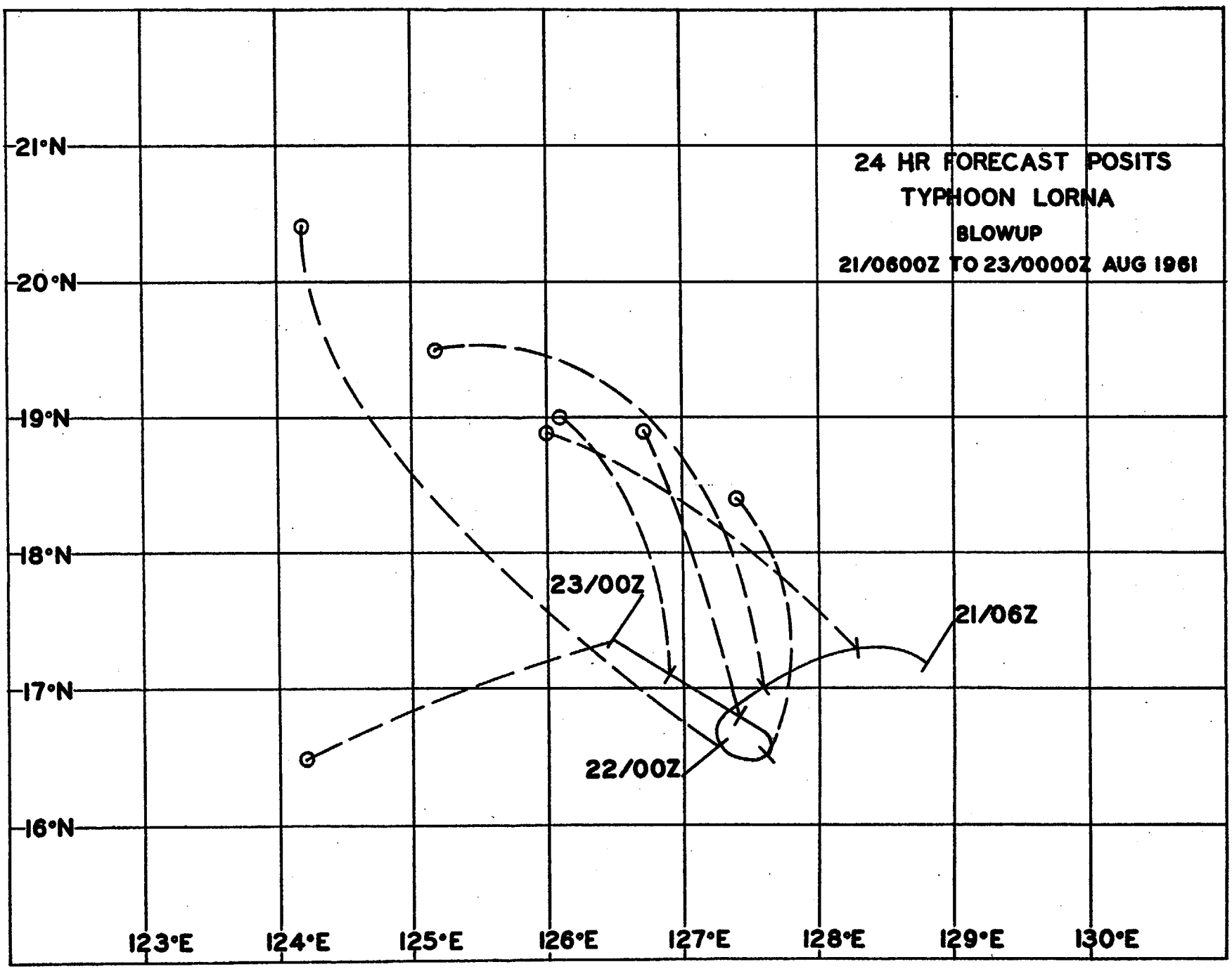
FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
1	190610Z	12.8N	132.7E	56-P-08	25	22	10150	---	08/08	CIRC 20MI DIA
2	200450Z	15.3N	130.0E	VW1-R-05	---	---	----	---	-----	CIRC OPEN N
3	210700Z	17.1N	128.7E	56-P-04	70	25	9910	993	15/14	CIRC 40MI DIA OPEN N-E
4	212145Z	16.6N	127.1E	56-P-05	80	40	9820	980	17/15	ILL DEFINED OPEN N & E
5	220900Z	16.8N	127.5E	56-P-07	150	60	9630	974	18/14	CIRC DIA 30MI OPEN NE
6	221530Z	16.9N	127.1E	VW1-R-10	---	---	----	---	-----	25MI DIA OPEN N
7	222300Z	17.3N	126.6E	56-P-05	110	55	9490	976	18/18	ILL DEFINED OPEN N
8	230900Z	17.8N	126.1E	56-P-07	100	70	9380	970	19/07	CIRC DIA 26MI
9	231600Z	18.8N	125.0E	VW1-R-05	---	---	----	---	-----	CIRC DIA 28MI OPEN SE
10	232215Z	19.4N	124.2E	56-P-02	130	70	9000	947	18/12	DIA 35MI OPEN SE
11	240600Z	20.7N	123.1E	LND/RDR	---	---	----	---	-----	----------
12	240900Z	20.8N	122.8E	56-P-07	150	90	8880	950	22/13	CIRC DIA 15MI
13	241200Z	21.2N	122.1E	LND/RDR	---	---	----	---	-----	----------
14	241800Z	21.9N	121.5E	LND/RDR	---	---	----	---	-----	----------
15	250000Z	22.6N	120.6E	LND/RDR	---	---	----	---	-----	----------
16	250130Z	22.9N	120.1E	LND/RDR	---	---	----	---	-----	----------

TYPHOON LORNA 20-26 AUG 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG. DISTANCE	48 HR. ERROR DEG. DISTANCE
201200Z	15.7N	129.9E	-------	-------
201800Z	16.3N	129.6E	-------	-------
210000Z	16.7N	129.3E	-------	-------
210600Z	17.2N	128.8E	-------	-------
211200Z	17.3N	128.3E	-------	-------
211800Z	17.0N	127.6E	-------	-------
220000Z	16.6N	127.3E	-------	-------
220600Z	16.5N	127.6E	358-119	-------
221200Z	16.8N	127.4E	340-133	-------
221800Z	17.1N	126.9E	337-124	-------
230000Z	17.4N	126.5E	247-140	-------
230600Z	17.9N	125.9E	241-157	338-149
231200Z	18.4N	125.4E	135-117	333-143
231800Z	19.0N	124.7E	152-105	325-136
240000Z	19.7N	124.0E	165-109	272-159
240600Z	20.4N	123.2E	167-135	206-182
241200Z	21.2N	122.4E	146-166	149-234
241800Z	21.8N	121.6E	243-36	165-210
250000Z	22.7N	120.7E	072-51	169-230
250600Z	23.1N	119.7E	062-114	167-234
251200Z	23.8N	119.3E	039-141	156-259
251800Z	24.2N	118.9E	054-139	037-142
260000Z	24.9N	117.8E	062-110	152-169
260600Z	25.3N	116.8E	019-140	053-240
261200Z	25.5N	116.1E	056-120	048-252

AVERAGE 24 HOUR ERROR 120 MI
AVERAGE 48 HOUR ERROR 196 MI


24 HR FORECAST POSITS
TYPHOON LORNA
20–26 AUGUST 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
26/00Z
25/00Z
24/00Z
23/00Z
21/00Z
SEE FOLLOWING PAGE FOR BLOWUP
SHANGHAI
HONG KONG
MANILA
OKINAWA
CHICHI JIMA
IWO JIMA
SAIPAN
GUAM
4YT
45
46
120°
130°
140°
30°
20°
10°


24 HR FORECAST POSITS
TYPHOON LORNA
BLOWUP
21/0600Z TO 23/0000Z AUG 1961
21°N
20°N
19°N
18°N
17°N
16°N
123°E
124°E
125°E
126°E
127°E
128°E
129°E
130°E
23/00Z
21/06Z
22/00Z

K. TYPHOON NANCY (071200Z-170600Z SEPTEMBER 1961)

AT 070000Z A LOW APPEARED ON THE SURFACE MAP W OF KWAJALEIN ATOLL MARKING THE BEGINNING OF WHAT WAS TO BECOME THE MOST PROLONGED TYPHOON OF THE SEASON. THE FIRST TROPICAL DEPRESSION WARNING WAS ISSUED AT 071200Z AND THE SYSTEM WAS UPGRADED TO A TROPICAL STORM AT 080000Z WHEN IT BECAME OBVIOUS THAT INTENSIFICATION WAS TAKING PLACE. BY THE TIME A RECONNAISSANCE FIX COULD BE MADE, NANCY HAD SURFACE WINDS OF 125 KTS REVEALING THAT SHE WAS AN "EXPLOSIVE DEEPENER" AND HAD PROBABLY REACHED TYPHOON INTENSITY AT 071800Z.

FROM THE TIME OF THE FIRST WARNING NANCY FOLLOWED A SMOOTH WESTERLY TRACK CURVING SLIGHTLY TOWARD THE N. SHE CONTINUED TO INTENSIFY, PASSING 85 MI SSW OF GUAM AT 101800Z WITH MAXIMUM SURFACE WINDS OF 180 KTS. AFTER REACHING THE PEAK INTENSITY OF 185 KTS NANCY STARTED WEAKENING AND BEGAN A MORE PRONOUNCED RECURVATURE, PASSING 40 MI E OF OKINAWA AT 141500Z AND OVER NAZE AT 150000Z. AT THIS TIME MOST FORECASTING RULES INDICATED THAT NANCY WOULD SWING WIDE AROUND JAPAN AND RECURVE INTO THE JAPAN SEA. HOWEVER, BY 151200Z A MARKED CHANGE HAD TAKEN PLACE IN THE UPPER AIR PATTERN AROUND THE TYPHOON. NANCY'S DIAMETER DIMINISHED SIGNIFICANTLY AT THE 500 MB LEVEL AND THE SUBTROPICAL HIGH WHICH HAD BEEN QUASISTATIONARY NEAR 30N 145E SHIFTED 10 DEGREES TO THE E. NANCY THEN ACCELERATED AND RECURVED MORE SHARPLY, BUT UPON ENCOUNTERING THE JAPANESE LAND MASS SHE DEFLECTED BACK TOWARD THE N, PASSING DIRECTLY OVER MUROTO ZAKI AT APPROXIMATELY 160100Z. THE TYPHOON ENTERED HONSHU NEAR OSAKA AT 160430Z, AND BY THIS TIME HAD WEAKENED TO 75 KTS. SHE MADE A RAPID TRANSIT ACROSS HONSHU EMERGING INTO THE JAPAN SEA NEAR NANAO AND CONTINUED NNE TO HOKKAIDO.

THE FINAL WARNING WAS ISSUED AT 170600Z WHEN NANCY HAD CROSSED INTO THE SEA OF OKHOTSK AND HAD OBVIOUSLY LOST HER TROPICAL CHARACTERISTICS. THE MAXIMUM SURFACE WINDS WERE 55 KTS AT THAT TIME.

A TOTAL OF 40 WARNINGS WERE ISSUED, COVERING A PERIOD OF 9 DAYS AND 18 HOURS. NANCY'S SURFACE WINDS REMAINED OVER 100 KTS FOR 8 DAYS, FROM 080000Z TO 160000Z. SHE TRAVELED 4275 MI AT AN AVERAGE SPEED OF 18 KTS. THE MINIMUM SPEED WAS 11 KTS ON 15 SEPTEMBER AND THE MAXIMUM SPEED WAS 55 KTS WHEN NANCY WAS OVER NORTHERN JAPAN. WARNINGS WERE ISSUED ON TYPHOONS OLGA AND PAMELA DURING THE LIFE OF NANCY.

THE DAMAGE CREATED BY TYPHOON NANCY WAS PHENOMENAL. IT TRAVELED ACROSS SOME OF THE MOST DENSELY POPULATED AREAS THAT EXIST, YET THE DEATH TOLL PROBABLY DID NOT EXCEED 225, AND THE DAMAGE WAS SMALL COMPARED TO THAT CREATED BY TYPHOONS OF EARLIER YEARS. EXAMINATION OF AVAILABLE INFORMATION INDICATES THAT PROPARATIONS WERE MADE WELL IN ADVANCE OF THE ARRIVAL OF NANCY FOR PROTECTION AGAINST STRONG WINDS, FLOODING, AND HIGH SEAS. THIS IS PARTICULARLY NOTABLE IN JAPAN, FOR THE PATH OF NANCY WAS SUCH THAT IT AFFECTED ALL OF THAT NATION TO

SOME DEGREE.

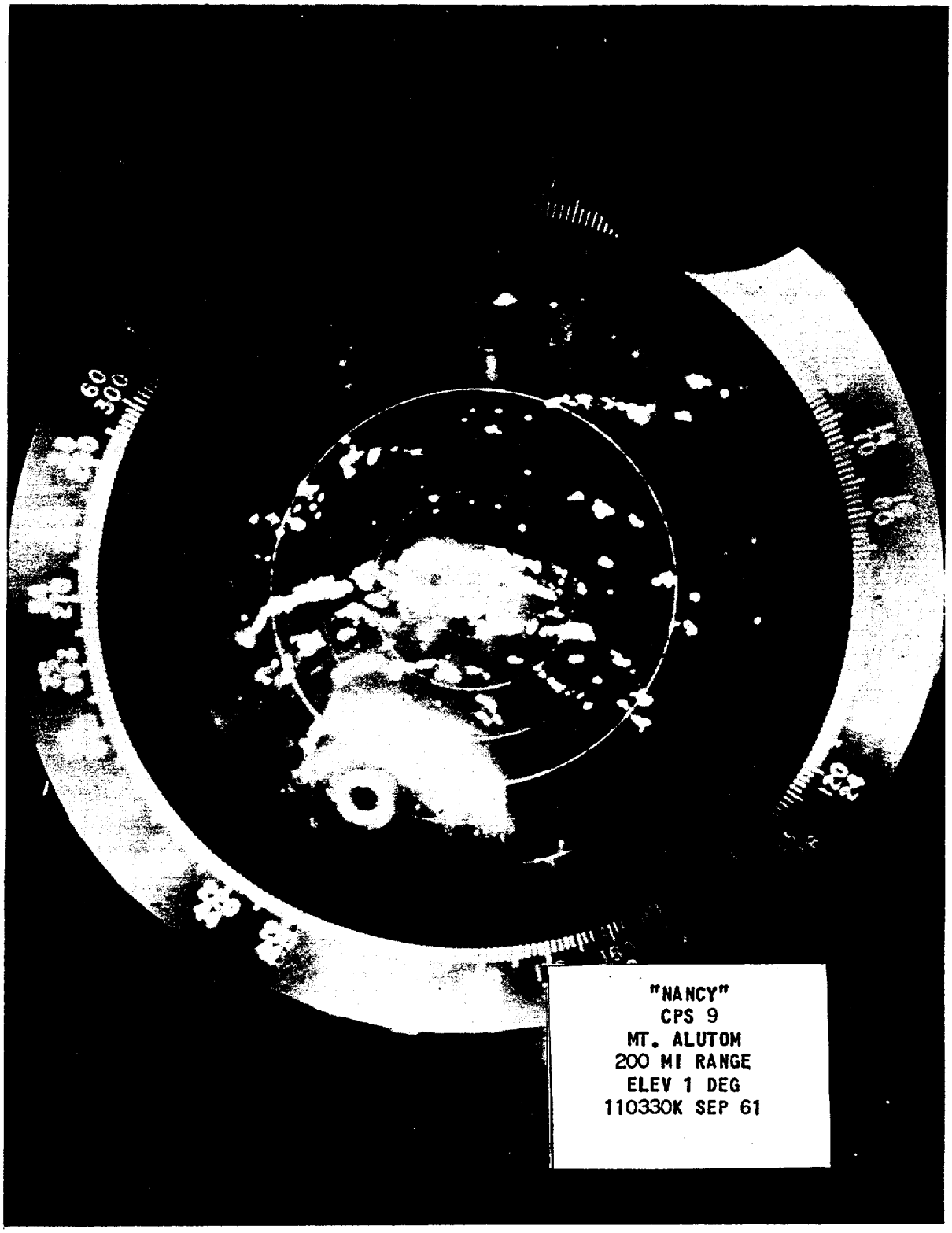
A SUMMARY OF DAMAGE IS PRESENTED HERE:

GUAM: ROADS WERE DAMAGED TO THE EXTENT THAT REPAIRS WERE ESTIMATED TO COST APPROXIMATELY $40,000. ABOUT 50 PERCENT OF CROPS ON THE SOUTHERN END OF THE ISLAND, SUCH AS BEANS, BANANAS, TOMATOES, BREADFRUIT, MELONS, AND CUCUMBERS WERE DESTROYED DUE TO STRONG WINDS AND HEAVY RAIN. THE NORTHERN END OF THE ISLAND SUFFERED LITTLE DAMAGE.

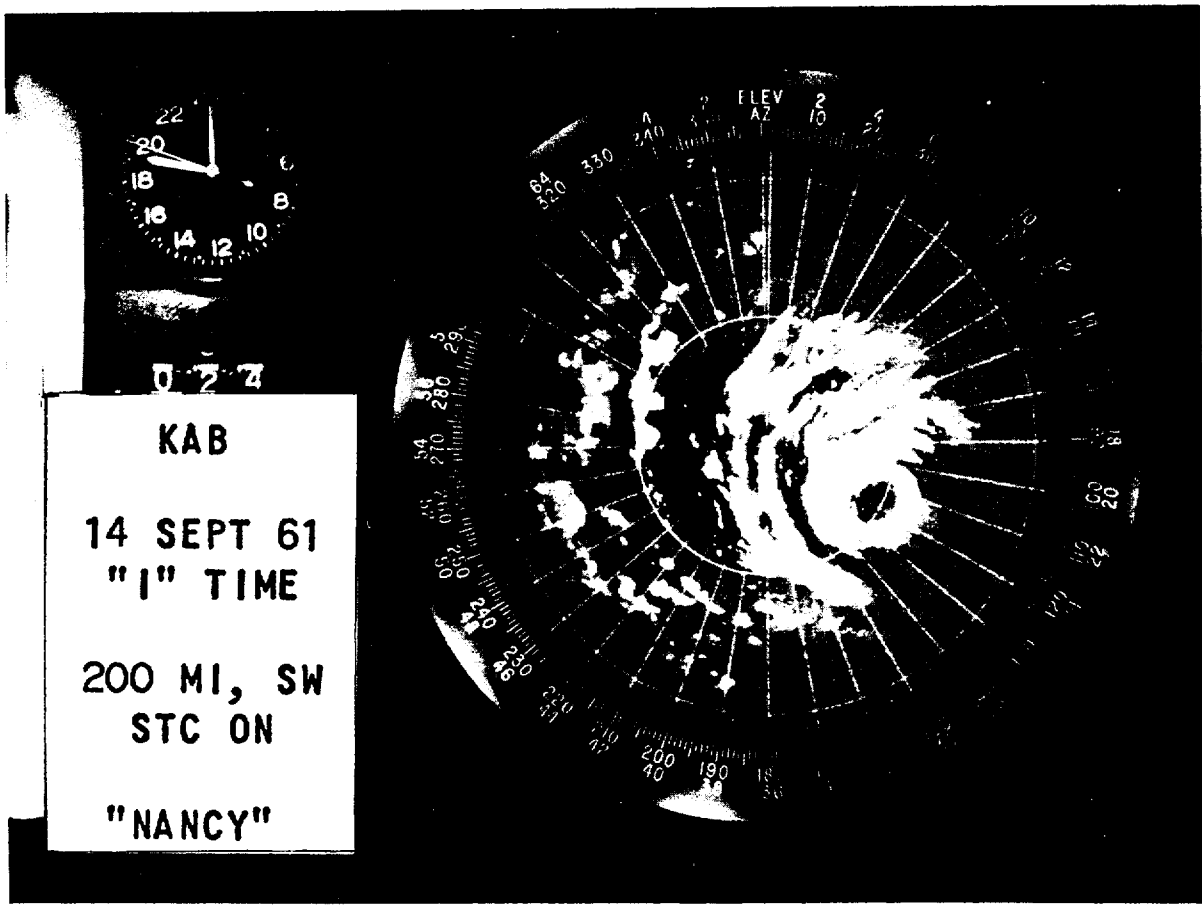
OKINAWA: EXTENSIVE CROP AND STRUCTURAL DAMAGE AND FLOODING OF LOW LYING AREAS OCCURRED BUT NO LOSS OF LIFE.

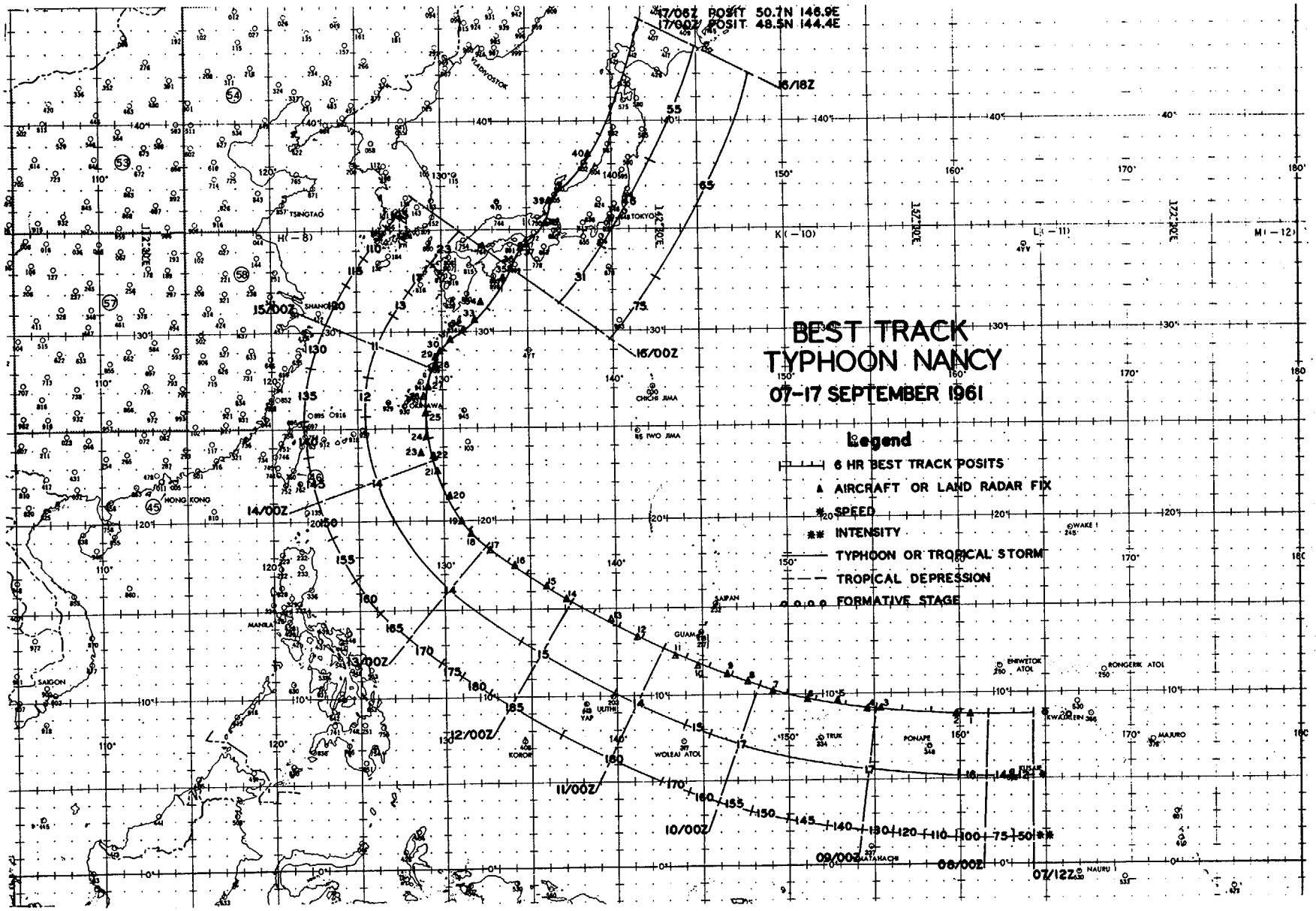
AMAMI-O-SHIMA: ONE PERSON MISSING, ONE SERIOUSLY HURT, AND 152 PEOPLE WERE LEFT HOMELESS. ONE SHIP WAS SUNK, COMMUNICATIONS WERE LOST AND EXTENSIVE FLOODING OF HOMES AND CROPS ALSO OCCURRED.

JAPAN: THERE WERE 172 PERSONS REPORTED DEAD, 18 MISSING, AND 3,184 INJURED. THE JAPAN NATIONAL POLICE REPORTED THAT AS A RESULT OF NANCY, MORE THAN 650,000 PERSONS WERE LEFT HOMELESS, 11,539 HOMES WERE DESTROYED, 32,604 HOMES WERE PARTIALLY DESTROYED, AND 280,078 HOMES WERE FLOODED. MORE THAN 300 SHIPS WERE SUNK, AND MANY DAMAGED. THE FLOODS CAUSED A LOSS OF 566 BRIDGES, CAUSED 1,146 LANDSLIDES AND CUT ROADS AT 2,053 PLACES. JAPANESE OFFICIALS SAID NANCY WAS RATED SIXTH IN THE NUMBER OF PERSONS KILLED BY AN INDIVIDUAL TYPHOON. TYPHOON VERA KILLED 4,464 PERSONS IN NAGOYA ON 26 SEPTEMBER 1959, THE WORST IN JAPANESE HISTORY.


"NANCY"
CPS 9
MT. ALUTOM
200 MI RANGE
ELEV 1 DEG
110330K SEP 61


21.2N 130.3E
9-13-61
VW-1
APS-20
0452-NANCY
"NANCY"


KAB
14 SEPT 61
"I" TIME
200 MI, SW
STC ON
"NANCY"


17/06Z POSIT 50.7N 146.9E
17/00Z POSIT 48.5N 144.4E
16/18Z
16/00Z
15/00Z
14/00Z
13/00Z
12/00Z
11/00Z
10/00Z
09/00Z
08/00Z
07/12Z
BEST TRACK
TYPHOON NANCY
07-17 SEPTEMBER 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT OR LAND RADAR FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
VLADIVOSTOK
TSINGTAO
SHANGHAI
TOKYO
CHICHI JIMA
IWO JIMA
HONG KONG
SAIGON
MANILA
SAIPAN
GUAM
WAKE I
ENIWETOK ATOL
RONGERIK ATOL
KWAJALEIN
MAJURO
TRUK
PONAPE
KOROR
WOLEAI ATOLL
NAURU

LAND RADAR AND AIRCRAFT FIXES - TYPHOON NANCY

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/Td (°C)	EYE CHARACTERISTICS
1	080230Z	08.8N	160.8E	LND/RDR	---	---	----	---	-----	----------
2	080625Z	08.9N	160.0E	56-P-06	125	60	9580	978	13/09	WALL CLDS ALL QUADS ELLIP 30MI N-S & 20MI E-W
3	082130Z	09.1N	155.5E	56-P-05	130	90	9220	---	16/06	CIRC DIA 10MI
4	090100Z	09.1N	154.8E	56-P-10	150	100	9080	956	18/11	WELL DEFINED CIRC 25MI DIA
5	090706Z	09.5N	153.0E	56-P-05	165	110	8410	928	16/13	CIRC 10MI DIA NO CLDS IN EYE
6	091330Z	09.7N	151.2E	VW1-R-03	---	---	----	---	-----	DIA 8MI
7	092130Z	10.1N	149.2E	56-P-03	180	120	8240	---	17/12	CIRC 8MI DIA WALL CLDS ALL QUADS
8	100230Z	10.8N	147.7E	56-P-02	200	130	7890	925	16/15	CIRC 8MI DIA
9	100705Z	11.2N	146.4E	56-P-02	200	160	7770	916	20/08	CIRC DIA 25MI
10	101345Z	11.7N	144.8E	LND/RDR	---	---	----	---	-----	----------
11	101950Z	12.2N	143.3E	LND/RDR	---	---	----	---	-----	----------
12	110700Z	13.3N	141.2E	56-P-02	200	130	7190	901	20/15	17MI DIA, WELL DEFINED
13	111330Z	14.3N	139.9E	VW1-R-03	---	---	----	---	-----	CIRC 16MI DIA
14	120045Z	15.7N	137.2E	56-P-02	200	150	6801	888	20/17	CIRC 6MI DIA
15	120630Z	16.3N	136.0E	56-P-02	200	130	6990	890	20/18	ELLIP N-S 18MI E-W 12MI
16	121400Z	17.5N	134.1E	VW1-R-03	---	---	----	---	-----	CIRC 25MI DIA
17	122145Z	18.2N	132.8E	56-P-08	180	140	6900	889	18/14	CIRC DIA 10MI
18	130415Z	19.2N	131.5E	56-P-01	150	140	6885	889	21/16	CIRC 25MI DIA
19	130830Z	19.9N	131.0E	56-P-01	120	130	6990	882	18/15	CIRC 15MI DIA
20	131453Z	21.2N	130.3E	VW1-R-05	---	---	----	---	-----	INNER EYE 27MI DIA OUTER EYE 52MI DIA

LAND RADAR AND AIRCRAFT FIXES - TYPHOON NANCY (CONT'D)

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
21	132200Z	22.7N	129.7E	56-P-05	160	125	7380	902	17/17	40MI DIA
22	140000Z	23.4N	129.4E	LND/RDR	---	---	----	---	-----	----------
23	140245Z	23.7N	128.8E	56-P-05	150	135	7490	903	19/17	CIRC 50MI DIA
24	140525Z	24.6N	129.0E	LND/RDR	---	---	----	---	-----	----------
25	141115Z	25.9N	129.0E	LND/RDR	---	---	----	---	-----	----------
26	141500Z	26.7N	128.9E	LND/RDR	---	---	----	---	-----	----------
27	141745Z	27.1N	129.1E	LND/RDR	---	---	----	---	-----	----------
28	142320Z	28.1N	129.5E	LND/RDR	---	---	----	---	-----	DIA 33MI
29	150356Z	28.7N	129.6E	56-P-01	120	87	7830	920	18/18	CIRC 60MI DIA WALL CLDS ALL QUADS
30	150600Z	29.0N	130.0E	LND/RDR	---	---	----	---	-----	----------
31	151000Z	29.6N	130.6E	LND/RDR	---	---	----	---	-----	----------
32	151300Z	30.1N	131.2E	LND/RDR	---	---	----	---	-----	----------
33	151500Z	30.5N	131.6E	LND/RDR	---	---	----	---	-----	----------
34	151800Z	31.4N	132.2E	LND/RDR	---	---	----	---	-----	----------
35	152155Z	32.2N	133.1E	LND/RDR	---	---	----	---	-----	----------
36	160000Z	33.1N	133.9E	LND/RDR	---	---	----	---	-----	----------
37	160300Z	34.1N	134.7E	LND/RDR	---	---	----	---	-----	----------
38	160530Z	35.2N	136.1E	LND/RDR	---	---	----	---	-----	----------
39	160700Z	36.3N	136.2E	LND/RDR	---	---	----	---	-----	----------
40	161100Z	38.5N	138.5E	LND/RDR	---	---	----	---	-----	----------

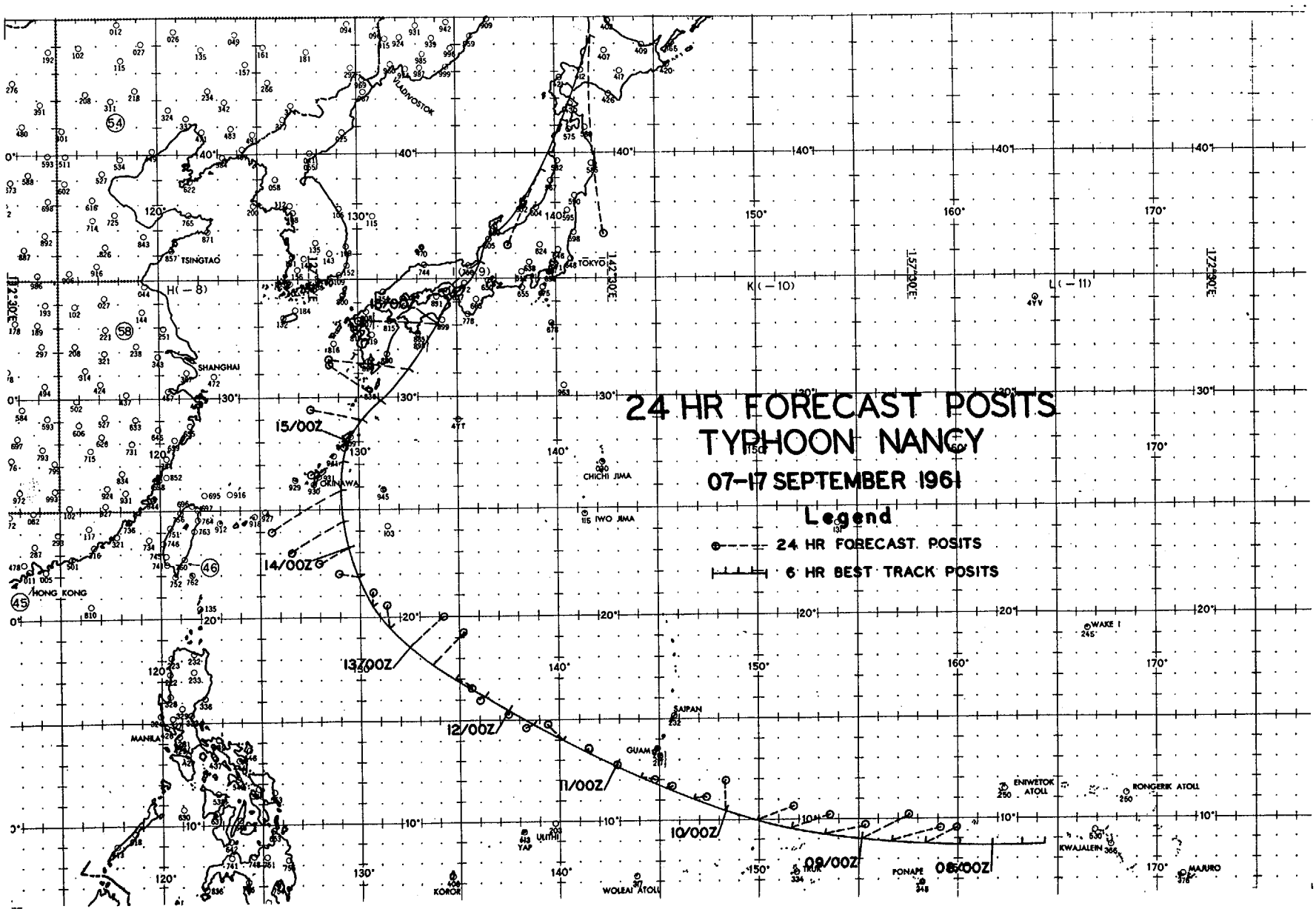
TYPHOON NANCY 07-17 SEP 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG.	DISTANCE	48 HR. ERROR DEG.	DISTANCE
071200Z	08.8N	164.3E	-------		-------	
071800Z	08.8N	163.2E	-------		-------	
080000Z	08.8N	161.8E	-------		-------	
080600Z	08.9N	160.1E	-------		-------	
081200Z	08.9N	158.4E	-------		-------	
081800Z	09.0N	156.8E	-------		-------	
090000Z	09.1N	155.1E	067	167	-------	
090600Z	09.3N	153.3E	076	119	-------	
091200Z	09.6N	151.7E	074	126	-------	
091800Z	10.0N	149.9E	066	116	-------	
100000Z	10.5N	148.3E	357	90	078	281
100600Z	11.0N	146.7E	079	31	086	184
101200Z	11.5N	145.2E	069	27	076	159
101800Z	12.0N	144.0E	360	48	077	154
110000Z	12.6N	142.8E	046	21	324	205
110600Z	13.2N	141.4E	344	23	336	25
111200Z	14.0N	140.1E	313	67	108	37
111800Z	14.8N	138.8E	263	35	112	95
120000Z	15.5N	137.5E	211	23	103	71
120600Z	16.2N	136.1E	213	19	078	70
121200Z	17.0N	134.9E	131	44	031	81
121800Z	17.7N	133.7E	045	121	115	37
130000Z	18.4N	132.3E	048	139	101	56
130600Z	19.4N	131.3E	356	64	118	41
131200Z	20.6N	130.6E	015	31	137	85
131800Z	21.9N	129.9E	297	54	063	120
140000Z	23.2N	129.4E	242	90	068	93
140600Z	24.6N	129.1E	236	167	261	84
141200Z	25.9N	128.9E	238	222	229	123
141800Z	27.2N	129.1E	245	93	243	226
150000Z	28.2N	129.3E	211	25	242	309
150600Z	29.1N	130.0E	283	130	248	316
151200Z	29.9N	131.1E	302	155	255	468
151800Z	31.2N	132.3E	277	200	262	287
160000Z	33.1N	134.0E	271	201	246	294
160600Z	35.5N	136.1E	231	104	251	373

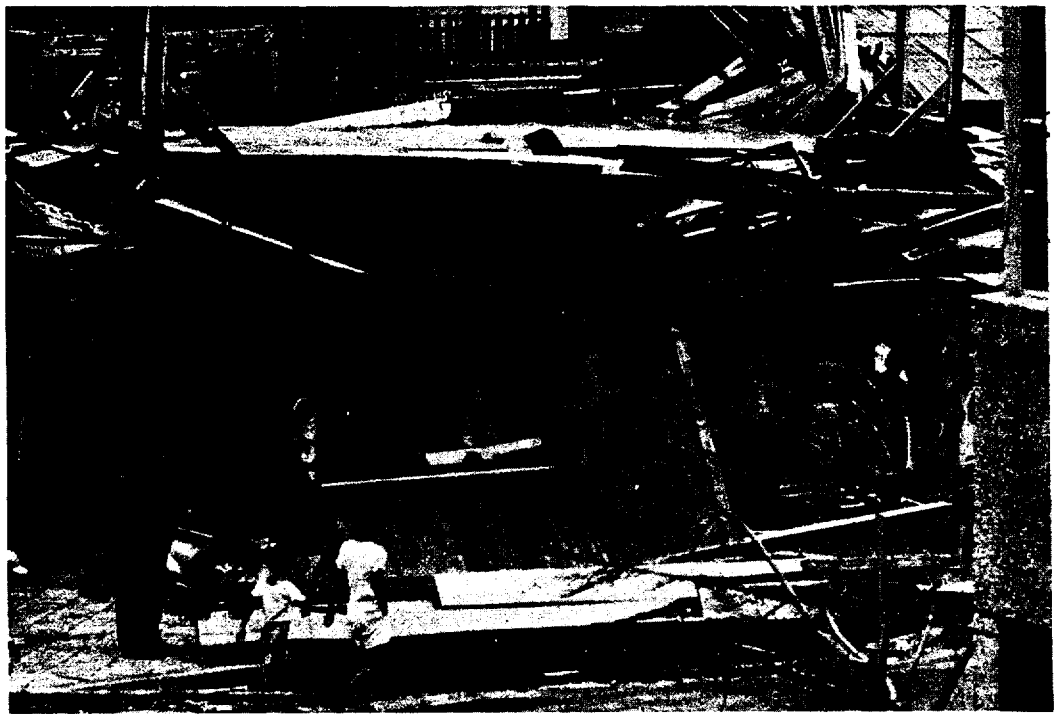
TYPHOON NANCY 07-17 SEP 1961
POSITION AND FORECAST VERIFICATION DATA (CONT'D)

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG.	DISTANCE	48 HR. ERROR DEG.	DISTANCE
161200Z	39.3N	139.2E	202	194	246	466
161800Z	44.6N	141.8E	177	465	227	660
170000Z	48.5N	144.4E	174	618	208	707
170600Z	50.7N	146.9E	154	494	192	747

AVERAGE 24 HOUR ERROR 133 MI
AVERAGE 48 HOUR ERROR 228 MI

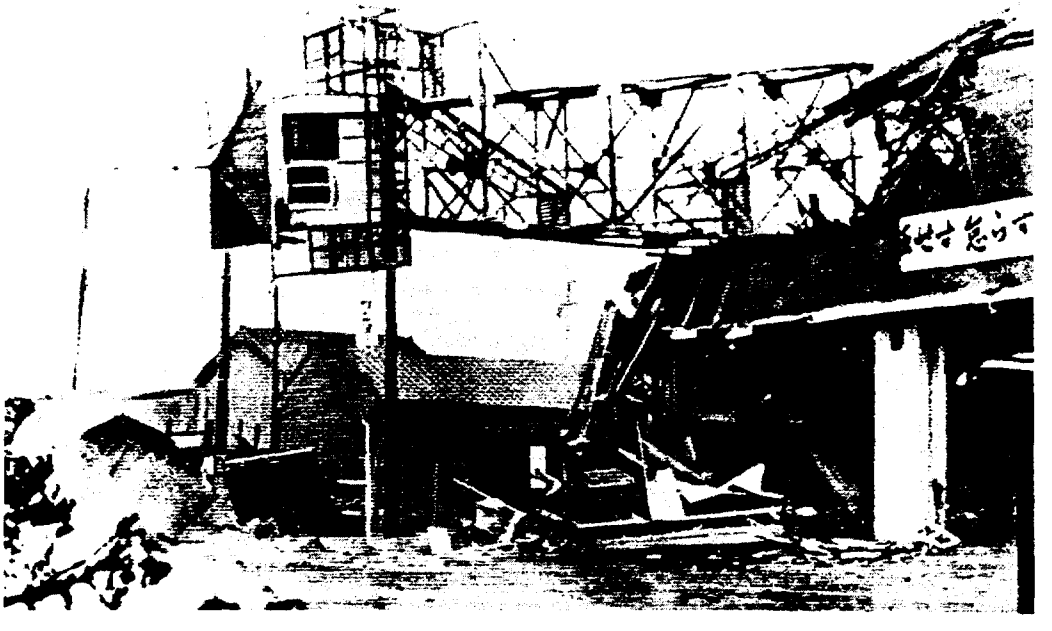

24 HR FORECAST POSITS
TYPHOON NANCY
07-17 SEPTEMBER 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
15/00Z
14/00Z
13/00Z
12/00Z
11/00Z
10/00Z
09/00Z
08/00Z
VLADIVOSTOK
TSINGTAO
SHANGHAI
TOKYO
OKINAWA
CHICHI JIMA
IWO JIMA
HONG KONG
MANILA
SAIPAN
GUAM
WAKE I
ENIWETOK ATOLL
RONGERIK ATOLL
KWAJALEIN
MAJURO
PONAPE
TRUK
WOLEAI ATOLL
KOROR
ULITHI
H(−8)
I(−9)
K(−10)
L(−11)

SHIP DAMAGED ON OKINAWA AS A RESULT OF WINDS AND SEAS ASSOCIATED WITH NANCY. SEPTEMBER 1961. (PACIFIC STARS AND STRIPES)



STRUCTURAL DAMAGE, NAHA, OKINAWA. NOTE INVERTED ROOF, CEILING AND SUPPORTS RESTING ON ROOF OF SHOP. SEPTEMBER 1961. (PACIFIC STARS AND STRIPES)

FLOODING CREATED IN TOKYO BY NANCY, EVEN THOUGH THE EYE OF THE TYPHOON WAS MORE THAN 160 MI AWAY. SEPTEMBER 1961. (PACIFIC STARS AND STRIPES)



STEEL FIRE OBSERVATION TOWER BROKEN IN HALF BY NANCY, OSAKA, JAPAN, 16 SEPTEMBER 1961. (AP WIRE PHOTO)

L. TYPHOON OLGA (080000Z-100600Z SEPTEMBER 1961)

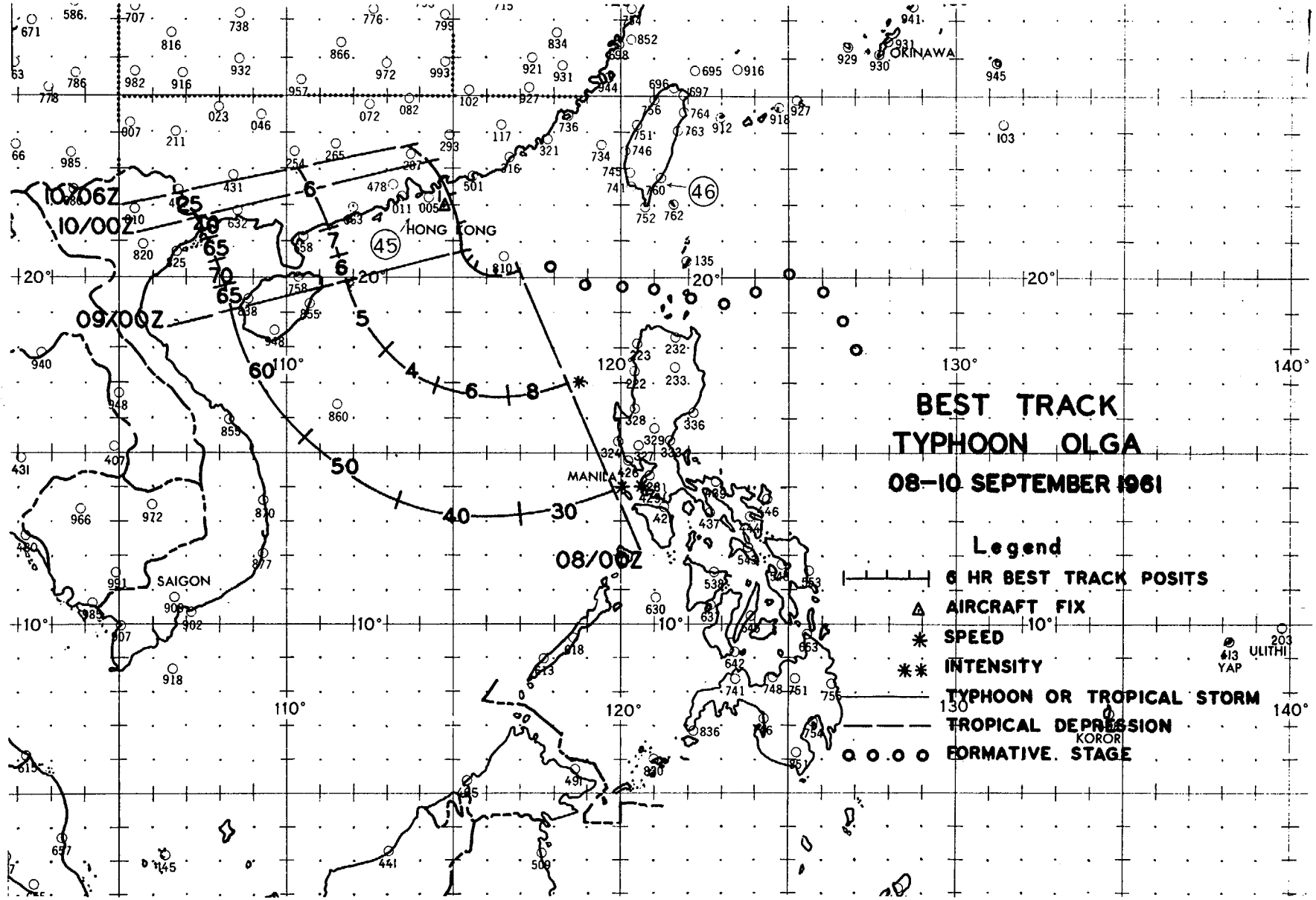
THE FORMATION OF THE LOW WHICH ULTIMATELY BECAME OLGA OCCURRED ALONG THE INTERTROPICAL CONVERGENCE ZONE E OF THE PHILIPPINE ISLANDS. FROM ITS ORIGIN IT DRIFTED SLOWLY WESTWARD WITH NO NOTICEABLE INTENSIFICATION UNTIL IT CROSSED INTO THE SOUTH CHINA SEA. ON 7 SEPTEMBER SHIP REPORTS INDICATED THAT THE SLP WAS BEGINNING TO DROP AND THE PERIPHERAL WINDS WERE INCREASING. THUS AT 080000Z JTWC ISSUED THE FIRST WARNING ON TROPICAL DEPRESSION 27.

THE AREA OF CYCLONIC CIRCULATION CONTINUED TO INCREASE AND BECOME MORE WELL DEFINED. AT 080600Z THE SYSTEM WAS UPGRADED TO A TROPICAL STORM AND ASSIGNED THE NAME OLGA. THE 081200Z 200 MB ANALYSIS INDICATED A MARKED TRANSITION TAKING PLACE IN THE SUBTROPICAL RIDGE. THE ANTICYCLONIC OUTDRAFT WHICH WAS LOCATED NE OF OLGA BROKE DOWN CAUSING THE RIDGE AXIS TO SHIFT TO THE S. IT WAS AT THIS TIME THAT OLGA MADE AN ABRUPT CHANGE FROM HER WESTERLY TRACK AND TURNED TOWARD THE N. THIS TURN WAS FORECAST PERFECTLY BY THE JOINT NUMERICAL WEATHER PREDICTION UNIT, SUITLAND, MD. OF ALL JNWP FORECASTS RECEIVED, THE ONE FOR OLGA VERIFIED CLOSEST TO THE BEST TRACK.

OLGA CONTINUED TO INTENSIFY AND WAS UPGRADED TO A TYPHOON AT 090000Z. AFTER REACHING THE MAXIMUM STRENGTH OF 70 KTS SHORTLY AFTER 090600Z OLGA STARTED TO WEAKEN SLIGHTLY BECAUSE OF HER PROXIMITY TO LAND. SHE ENTERED THE ASIATIC MAINLAND APPROXIMATELY 30 MI NE OF HONG KONG AT 091800Z. AT THE TIME OF HER PASSAGE OVER THE COASTLINE OLGA WAS STILL OF TYPHOON STRENGTH, BUT SHE WEAKENED RAPIDLY, AND THE FINAL WARNING WAS ISSUED AT 100600Z.

ONLY TEN WARNINGS WERE ISSUED ON OLGA, COVERING A PERIOD OF 2 DAYS AND 6 HOURS. SHE TRAVELED 325 MI AT AN AVERAGE SPEED OF 6 KTS. ALTHOUGH SHOWING AN ABRUPT CHANGE OF DIRECTION, OLGA'S TRACK IS NOT MARKEDLY DIFFERENT FROM OTHER TYPHOONS WHICH HAVE OCCURRED NEAR HONG KONG DURING PREVIOUS SEPTEMBERS.

STRONG WINDS AND HEAVY RAIN AFFECTED HONG KONG AND THE ASIATIC MAINLAND DURING THE LIFE OF OLGA AND 5 DEATHS WERE REPORTED AS A RESULT OF LANDSLIDES. A 300 TON FISHING TRAWLER BROKE LOOSE, DRIFTED AWAY AND CAPSIZED. RESCUE PARTIES SAVED ALL ABOARD. AIRLINE AND FERRY SERVICES WERE DISRUPTED, SOME TREES UPROOTED AND THE STREETS OF HONG KONG WERE LITTERED WITH DEBRIS. SOME CROP DAMAGE WAS REPORTED ON THE ASIATIC MAINLAND AND ABOUT 70 PEOPLE TOOK ADVANTAGE OF THE TYPHOON AND SOUGHT REFUGE IN HONG KONG.


BEST TRACK
TYPHOON OLGA
08–10 SEPTEMBER 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
10/06Z
10/00Z
09/00Z
08/00Z
HONG KONG
MANILA
SAIGON
OKINAWA
YAP
ULITHI
KOROR
110°
120°
130°
140°
20°
10°

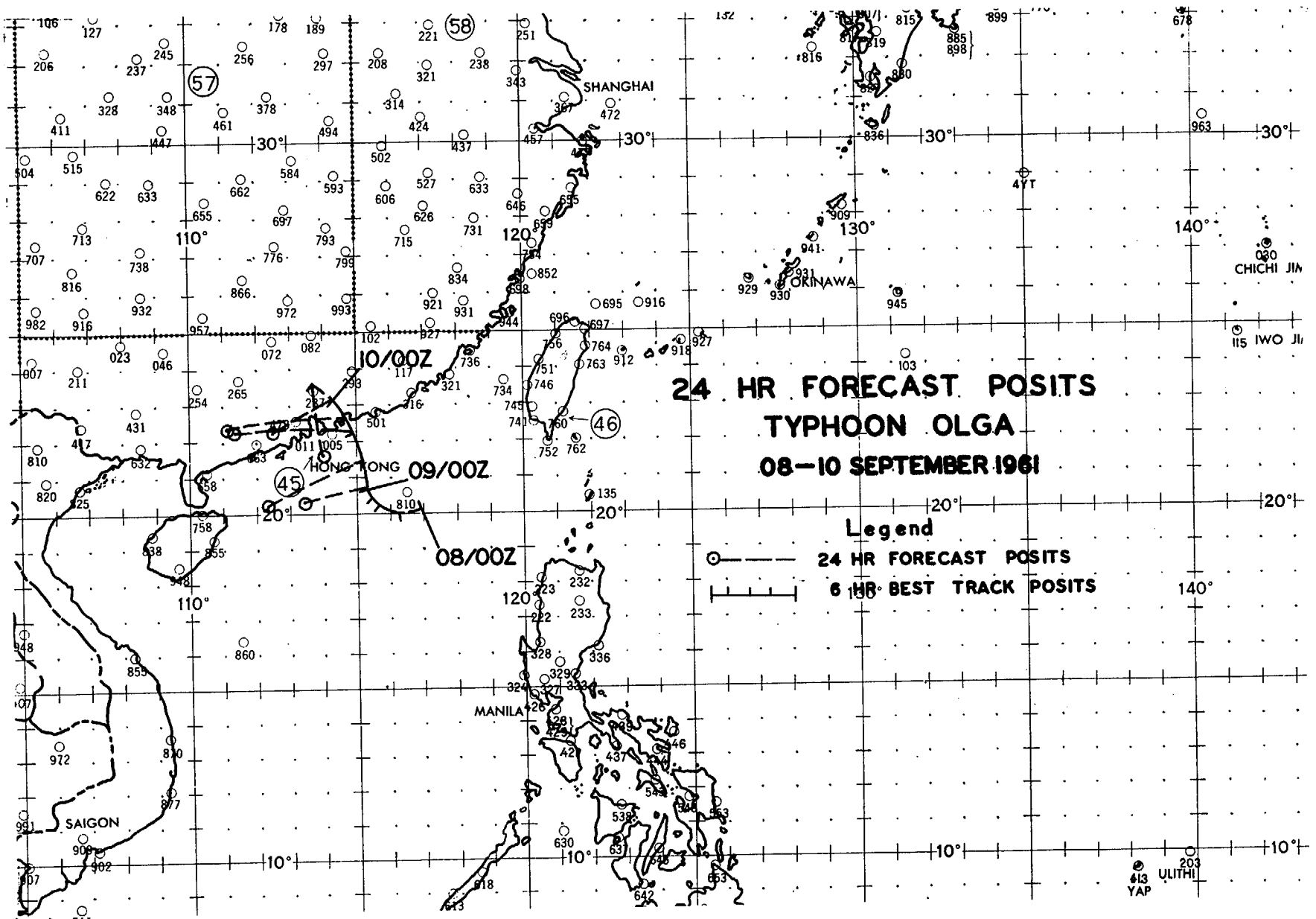
LAND RADAR AND AIRCRAFT FIXES - TYPHOON OLGA

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/T_D (^{0}C)	EYE CHARACTERISTICS
1	090930Z	22.0N	114.8E	USN-EST	---	---	-----	---	------	----------

TYPHOON OLGA 08-10 SEP 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG. DISTANCE	48 HR. ERROR DEG. DISTANCE
080000Z	20.2N	117.0E	-------	-------
080600Z	20.0N	116.2E	-------	-------
081200Z	20.1N	115.5E	-------	-------
081800Z	20.4N	115.3E	-------	-------
090000Z	20.9N	115.2E	-------	-------
090600Z	21.5N	115.2E	245-188	-------
091200Z	22.2N	114.9E	271-150	-------
091800Z	22.7N	114.7E	262-200	-------
100000Z	23.2N	114.3E	239-116	-------
100600Z	23.6N	113.7E	169-122	239-353

AVERAGE 24 HOUR ERROR 155 MI
AVERAGE 48 HOUR ERROR 353 MI


24 HR FORECAST POSITS
TYPHOON OLGA
08–10 SEPTEMBER 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
10/00Z
09/00Z
08/00Z
HONG KONG
SHANGHAI
OKINAWA
MANILA
SAIGON
CHICHI JIMA
IWO JIMA
YAP
ULITHI
110°
120°
130°
140°
30°
20°
10°

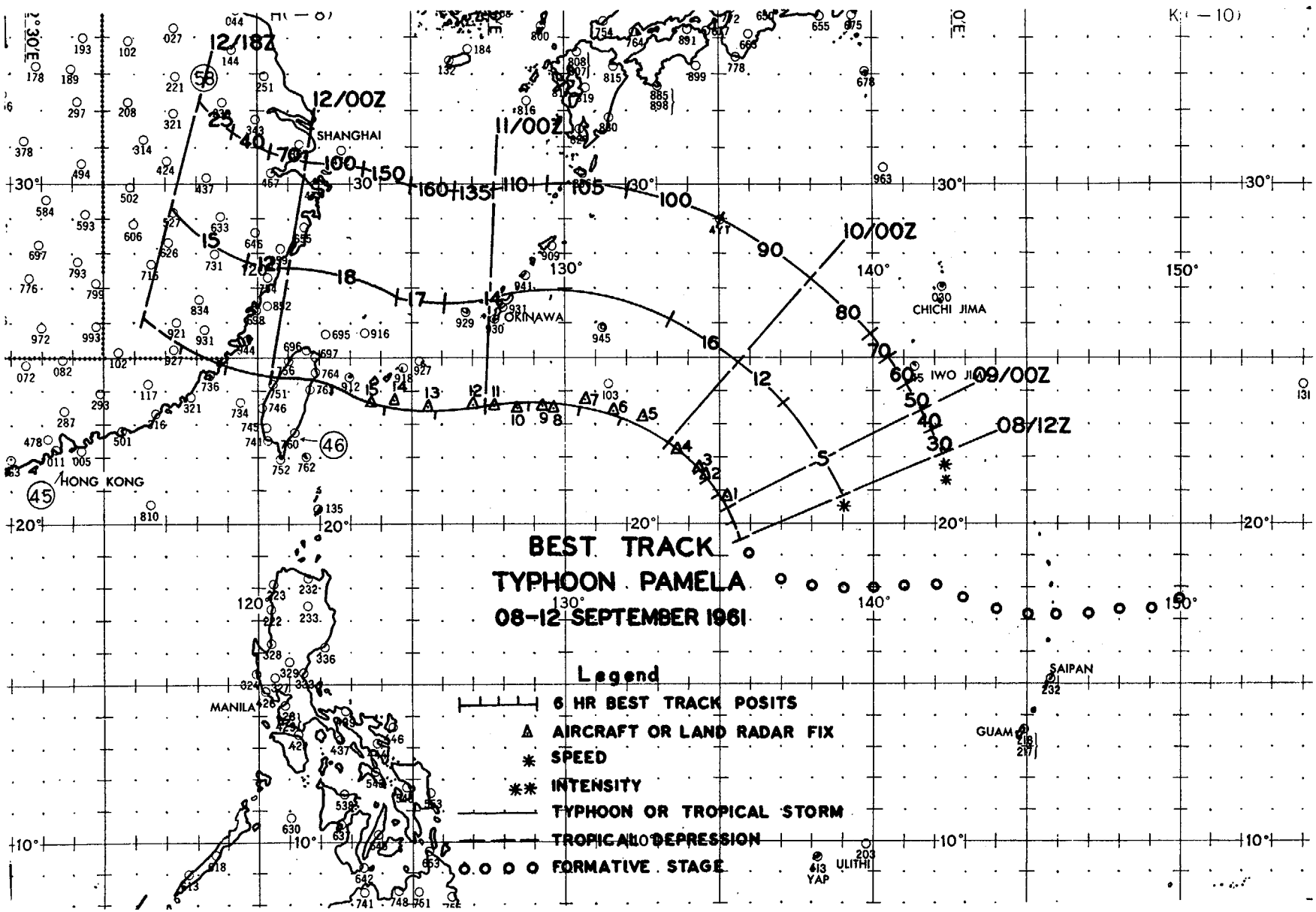
M. TYPHOON PAMELA (081200Z-121800Z SEPTEMBER 1961)

A WEAK CIRCULATION THAT WAS LATER TO BECOME TYPHOON PAMELA FIRST APPEARED ON 4 SEPTEMBER APPROXIMATELY 400 MI NE OF GUAM. IT MOVED SLOWLY W UNTIL 8 SEPTEMBER WHEN IT TURNED TOWARD THE NW AND BEGAN TO INTENSIFY. A TROPICAL DEPRESSION WARNING WAS ISSUED AT 081200Z AND A RECONNAISSANCE AIRCRAFT WAS DISPATCHED TO INVESTIGATE. BASED ON THE INFORMATION CONTAINED IN THE EYE MESSAGE REPORT, THE DEPRESSION WAS UPGRADED TO TROPICAL STORM INTENSITY ON THE 090600Z WARNING.

STARTING A GRADUAL TURN BACK TOWARD THE W, PAMELA CONTINUED TO INTENSIFY. THE FIRST TYPHOON WARNING WAS ISSUED AT 100000Z, HOWEVER, POST ANALYSIS INDICATES THAT PAMELA HAD ACTUALLY REACHED TYPHOON INTENSITY BY 091200Z. PROGRESSING ON A HEADING OF W, PAMELA PASSED 140 MI S OF OKINAWA AND CONTINUED STRAIGHT TOWARD CENTRAL TAIWAN. SHE REACHED HER MAXIMUM INTENSITY OF 160 KTS AT APPROXIMATELY 110900Z WHILE PASSING 65 MI S OF MIYAKO JIMA, THEN WEAKENED SLIGHTLY AND STARTED A SLIGHT DEFLECTION TO THE N. AS PAMELA APPROACHED TAIWAN, A TROUGH DEVELOPED S OF HER AND AT ABOUT 111600Z A LOW APPEARED IN THE TROUGH E OF THE ISLAND'S SOUTHERN TIP. THIS LOW REMAINED QUASI-STATIONARY AND PERSISTED UNTIL APPROXIMATELY 111200Z WHEN PAMELA ENTERED TAIWAN NEAR THE CITY OF KARENKO. THE TRANSIT ACROSS THE ISLAND'S 12,000 FT MOUNTAINS WEAKENED PAMELA TO SLIGHTLY LESS THAN 100 KTS INTENSITY AS SHE CROSSED INTO THE TAIWAN STRAITS. SHE ENTERED THE ASIATIC MAINLAND NEAR T'UNG-A AND CONTINUED STRAIGHT INLAND WEAKENING RAPIDLY. THE FINAL WARNING WAS ISSUED AT 121800Z.

EIGHTEEN WARNINGS WERE ISSUED ON PAMELA COVERING A PERIOD OF 4 DAYS AND 6 HOURS. SHE TRAVELED 1225 MI AT AN AVERAGE SPEED OF 12 KTS. THE MINIMUM SPEED WAS 5 KTS ON 8 AND 9 SEPTEMBER AND THE MAXIMUM SPEED WAS 18 KTS WHEN PAMELA WAS CROSSING TAIWAN.

TYPHOON PAMELA WAS THE 5TH TYPHOON TO STRIKE TAIWAN DURING THE YEAR; IT ALSO CREATED MORE DAMAGE THAN THE OTHERS. NINETY-EIGHT DEATHS, 27 PERSONS MISSING, AND 964 INJURED WERE REPORTED. FIFTY-TWO OF THE DEAD PERISHED AT YILAN, A FISHING PORT IN NORTHEAST TAIWAN. IT WAS ESTIMATED BY POLICE THAT 5,992 HOUSES COLLAPSED AND 12,995 WERE DAMAGED. AN ESTIMATED 50,000 PEOPLE WERE LEFT HOMELESS. DAMAGE WAS ESTIMATED TO BE IN EXCESS OF $4,000,000 TO CROPS, LAND AND HOMES. DAMAGE TO THE ASIATIC MAINLAND WAS NOT AVAILABLE.


BEST TRACK
TYPHOON PAMELA
08-12 SEPTEMBER 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT OR LAND RADAR FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
12/18Z
12/00Z
11/00Z
10/00Z
09/00Z
08/12Z
SHANGHAI
OKINAWA
CHICHI JIMA
IWO JIMA
HONG KONG
MANILA
SAIPAN
GUAM
YAP
ULITHI

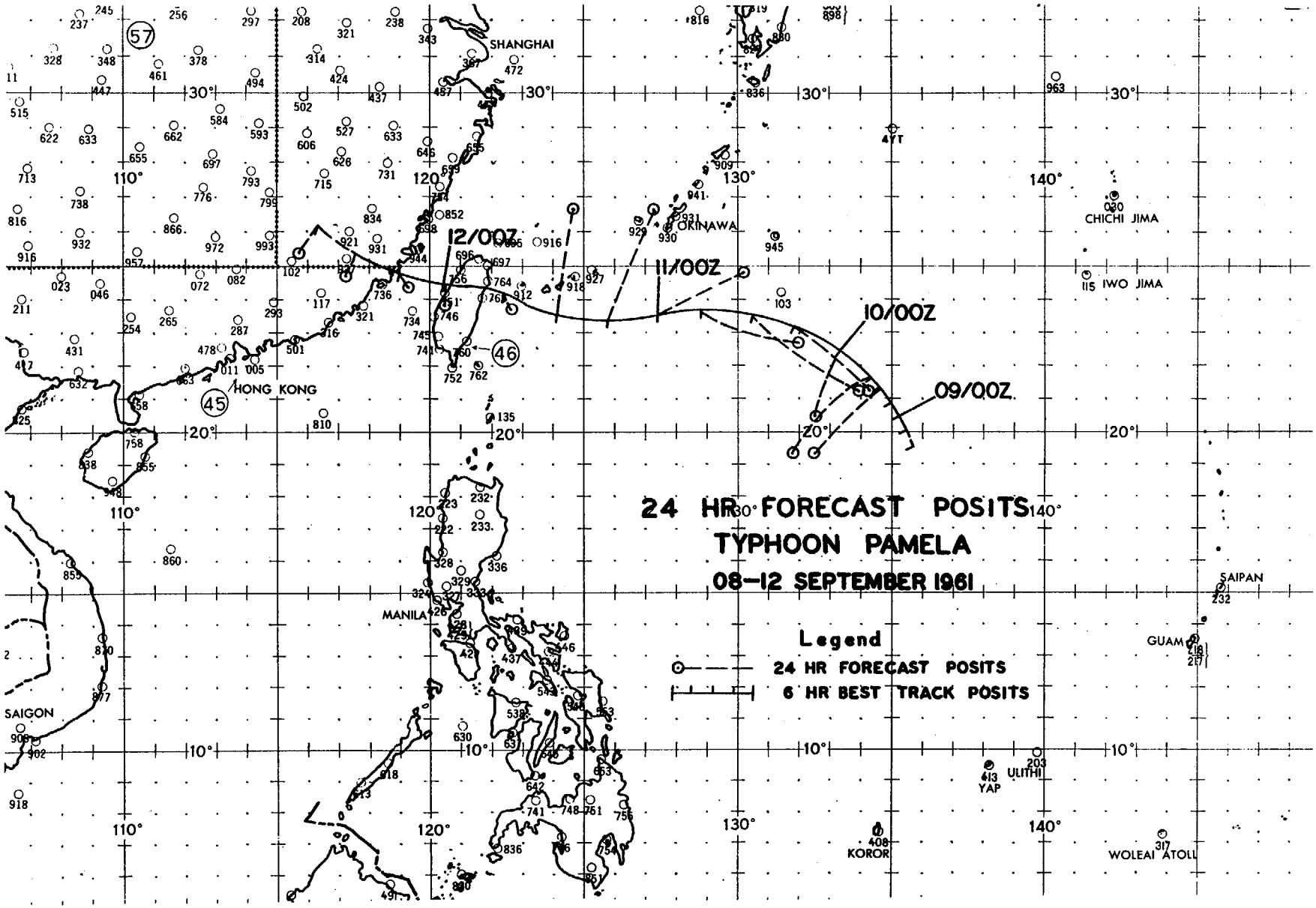
LAND RADAR AND AIRCRAFT FIXES - TYPHOON PAMELA

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
1	090430Z	20.8N	135.2E	VW1-P-05	45	---	----	982	-----	DIA 23 MI SPIRAL BANDS ALL QUADS
2	091440Z	21.5N	134.6E	VW1-R-10	---	---	----	---	-----	CIRC WELL DEFINED 7 MI DIA
3	091903Z	21.7N	134.4E	VW1-R-15	---	---	----	---	-----	DIA 14 MI
4	092200Z	22.2N	133.7E	56-P-04	75	60	9340	970	15/13	DIA 10 MI
5	100330Z	23.1N	132.5E	56-P-03	55	51	9290	---	14/12	POORLY DEFINED CIRC 12 MI DIA
6	100700Z	23.4N	131.6E	56-P-04	90	80	9150	952	17/14	CIRC 18 MI DIA
7	101250Z	23.8N	130.8E	VW1-R-05	---	---	----	---	-----	DIA 17 MI OPEN W
8	101605Z	23.6N	129.7E	VW1-R-04	---	---	----	---	-----	DIA 13 MI WALL CLD 3 MI WIDE
9	101646Z	23.7N	129.3E	LND/RDR	---	---	----	---	-----	12 MI DIA
10	101930Z	23.6N	128.4E	LND/RDR	---	---	----	---	-----	----------
11	102200Z	23.7N	127.8E	56-P-05	100	80	8040	---	18/12	CIRC 8 MI DIA WALL CLDS ALL QUADS
12	110130Z	23.7N	127.0E	56-P-01	130	100	7550	---	17/11	CIRC 6 MI DIA
13	110700Z	23.7N	125.7E	56-P-02	170	140	7440	914	16/16	SEVERE TURBULENCE NE QUAD
14	111100Z	23.8N	124.3E	LND/RDR	---	---	----	---	-----	----------
15	111300Z	23.8N	123.7E	LND/RDR	---	---	----	---	-----	----------

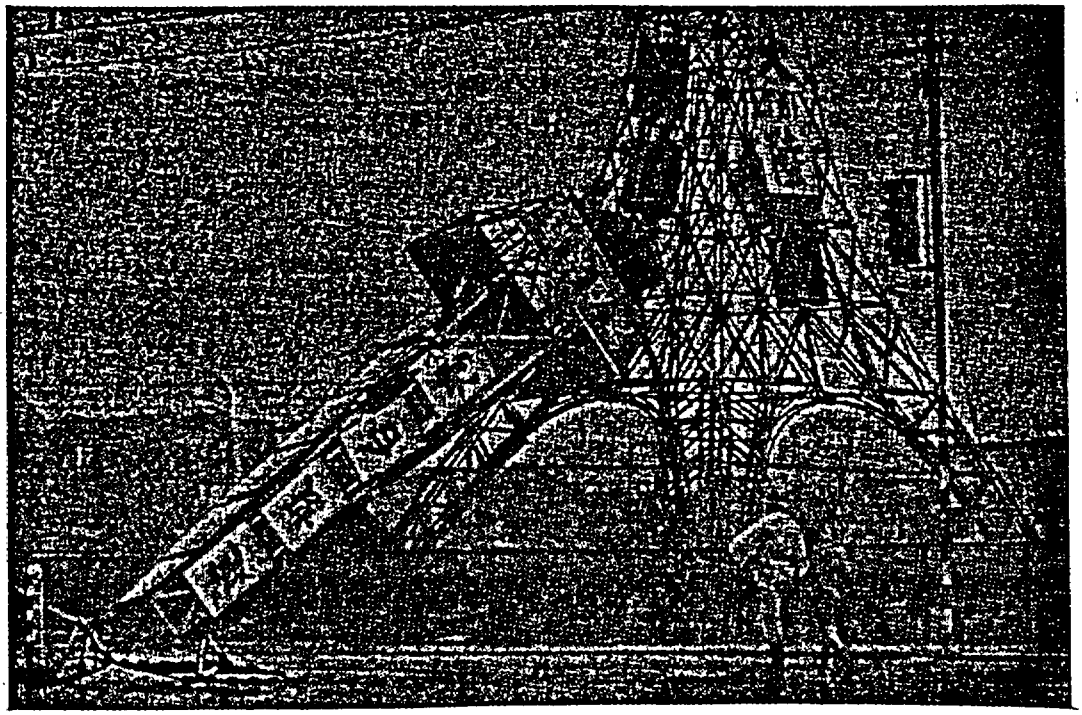
TYPHOON PAMELA 08-12 SEP 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG. DISTANCE	48 HR. ERROR DEG. DISTANCE
081200Z	19.6N	135.7E	-------	-------
081800Z	20.1N	135.4E	-------	-------
090000Z	20.6N	135.2E	-------	-------
090600Z	21.0N	135.0E	-------	-------
091200Z	21.3N	134.7E	-------	-------
091800Z	21.7N	134.3E	-------	-------
100000Z	22.5N	133.3E	-------	-------
100600Z	23.3N	131.9E	133-181	-------
101200Z	23.7N	130.4E	127-246	-------
101800Z	23.8N	128.9E	109-180	-------
110000Z	23.7N	127.4E	065-164	-------
110600Z	23.6N	125.9E	020-198	108-359
111200Z	23.7N	124.1E	011-190	103-376
111800Z	24.1N	122.2E	118-27	090-360
120000Z	24.4N	120.3E	169-31	067-360
120600Z	24.6N	119.0E	137-23	043-444
121200Z	25.3N	117.5E	218-33	029-247
121800Z	26.1N	116.1E	203-52	172-59

AVERAGE 24 HOUR ERROR 120 MI
AVERAGE 48 HOUR ERROR 315 MI


24 HR FORECAST POSITS
TYPHOON PAMELA
08–12 SEPTEMBER 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
12/00Z
11/00Z
10/00Z
09/00Z
SHANGHAI
OKINAWA
CHICHI JIMA
IWO JIMA
HONG KONG
MANILA
SAIGON
SAIPAN
GUAM
ULITHI
YAP
KOROR
WOLEAI ATOLL
110°
120°
130°
140°
30°
20°
10°

THIS RUBBLE WAS A BUILDING BEFORE PAMELA STRUCK TAIWAN. SEPTEMBER 1961. (PACIFIC STARS AND STRIPES)



ADVERTISING TOWER SNAPPED OFF IN TAIPER, TAIWAN, BY TYPHOON PAMELA. SEPTEMBER 1961. (PACIFIC STARS AND STRIPES)

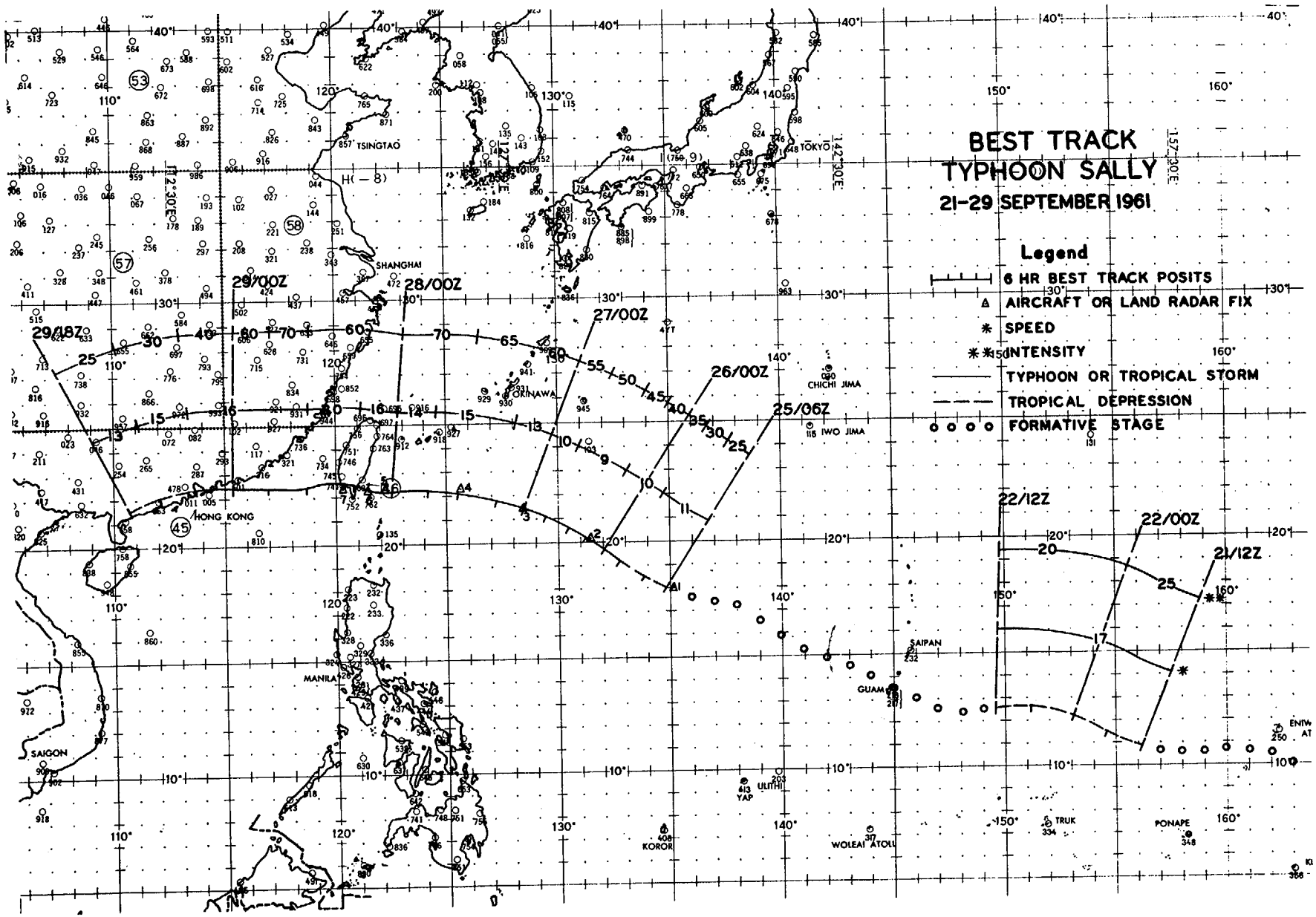
N. TYPHOON SALLY (211200Z-291800Z SEPTEMBER 1961)

THE 191800Z SURFACE CHART WAS THE FIRST TO SHOW THE EXISTENCE OF AN AREA OF LOW PRESSURE SITUATED TO THE E OF ENIWETOK ATOLL. AS THIS LOW MOVED TOWARD THE W, ITS FALLING PRESSURES AND INCREASING RADIUS OF CYCLONIC WINDS GAVE INDICATIONS OF INTENSIFICATION. THE FIRST TROPICAL DEPRESSION WARNING WAS ISSUED AT 212200Z, HOWEVER, SUBSEQUENT RECONNAISSANCE INVESTIGATIONS SHOWED LIGHT WINDS AND NO ORGANIZED CENTER; AND A FINAL WARNING WAS ISSUED AT 221200Z.

AERIAL SURVEILLANCE CONTINUED, BUT NO APPARENT CHANGE WAS NOTED. A PHOTOGRAPH OF THIS SYSTEM SHOWING A WELL DEFINED VORTEX WAS TAKEN AT 240047Z BY TIROS THREE DURING ITS 1056TH ORBIT. THE RECONNAISSANCE FIX OF 250455Z CONFIRMED THIS AND REPORTED 25 KT WINDS AND A 993 MB SLP. THE ISSUANCE OF TROPICAL DEPRESSION WARNINGS WAS RESUMED AT 250600Z. AT THIS TIME THE CENTER WAS MOVING TOWARD THE WNW AT 11 KTS AND INTENSIFYING SLOWLY. THE FIRST TROPICAL STORM WARNING WAS ISSUED AT 260600Z ALTHOUGH POST ANALYSIS SHOWS THAT SALLY ACTUALLY BECAME A TROPICAL STORM AT 251800Z. SHE STARTED A GRADUAL TURN TOWARD THE W AND CONTINUED INTENSIFYING, REACHING TYPHOON STRENGTH AT 270600Z. SALLY REACHED HER MAXIMUM INTENSITY (70 KTS) AT 271200Z AND AT THIS TIME WAS HEADED W TOWARD SOUTHERN TAIWAN. SHE CROSSED THE ISLAND AT APPROXIMATELY 280600Z AND AFTER WEAKENING SLIGHTLY, AGAIN REACHED 70 KTS INTENSITY AS SHE ENTERED THE TAIWAN STRAITS. SALLY CONTINUED MOVING TO THE W UNTIL SHE ENTERED THE ASIATIC MAINLAND PASSING 15 MI N OF HONG KONG. SHE HAD WEAKENED TO ABOUT 40 KTS AT THIS TIME AND CONTINUED TO WEAKEN AS SHE TURNED TOWARD THE WSW. SALLY REMAINED APPROXIMATELY 30 MI INLAND AND MOVED PARALLEL TO THE COASTLINE UNTIL 291800Z WHEN THE FINAL WARNING WAS ISSUED.

SALLY TRAVELLED 2,775 MI FROM THE FIRST TO LAST WARNING, 1,850 MI OF THIS DISTANCE COVERED BY WARNINGS WHILE THE REMAINING 925 MI OCCURRED DURING THE PERIOD THAT WARNINGS WERE NOT ISSUED. SALLY'S MINIMUM SPEED WAS 9 KTS ON 26 SEPTEMBER AND THE MAXIMUM SPEED OF 20 KTS OCCURRED WHILE CROSSING THE ISLAND OF TAIWAN.

INFORMATION CONCERNING DAMAGE BY SALLY WAS EXTREMELY LIMITED. DAMAGE TO CROPS ON TAIWAN AND THE ASIATIC MAINLAND IS KNOWN TO HAVE OCCURRED, HOWEVER THERE IS NO INFORMATION REGARDING LOSS OF LIFE OR SHIPPING AVAILABLE.


BEST TRACK
TYPHOON SALLY
21-29 SEPTEMBER 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT OR LAND RADAR FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
29/18Z
29/00Z
28/00Z
27/00Z
26/00Z
25/06Z
22/12Z
22/00Z
21/12Z
SHANGHAI
TSINGTAO
TOKYO
OKINAWA
CHICHI JIMA
IWO JIMA
HONG KONG
MANILA
SAIGON
SAIPAN
GUAM
YAP
ULITHI
KOROR
WOLEAI ATOLL
TRUK
PONAPE

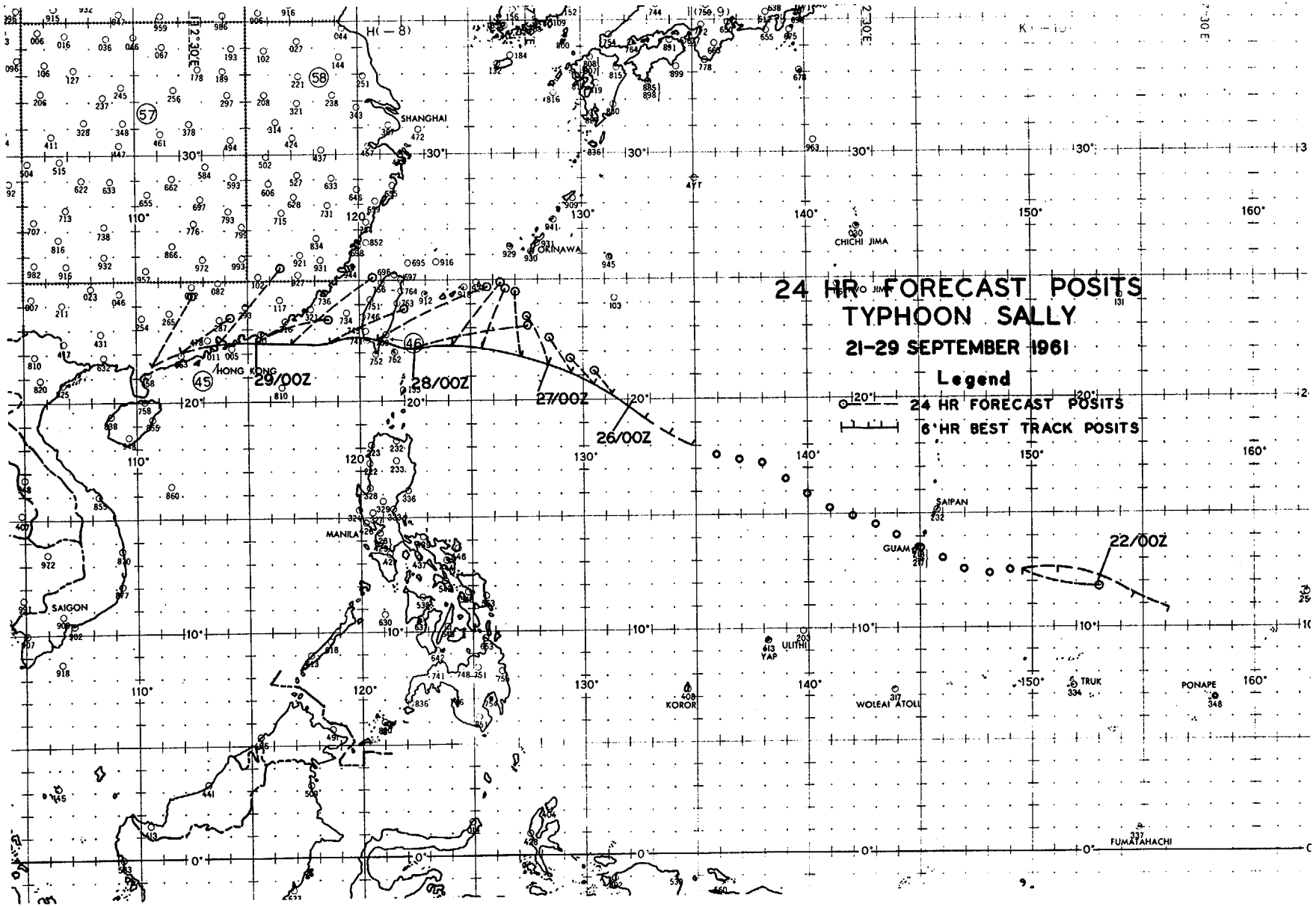
LAND RADAR AND AIRCRAFT FIXES - TYPHOON SALLY

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
1	250455Z	18.0N	135.1E	VW1-P-05	25	---	----	993	-----	----------
2	260545Z	20.3N	131.3E	VW1-P- U	40	---	----	984	-----	EYE 150 MI E-W
3	270020Z	21.5N	128.5E	VW1-P-10	60	---	----	983	-----	EYE 100 MI NW-SE 60 MI NE-SW
4	271130Z	22.3N	125.7E	LND/RDR	---	---	----	---	-----	DIA 40 MI
5	280100Z	22.3N	122.1E	LND/RDR	---	---	----	---	-----	WELL DEFINED
6	280300Z	22.3N	121.4E	LND/RDR	---	---	----	---	-----	ILL DEFINED
7	280800Z	22.3N	120.2E	LND/RDR	---	---	----	---	-----	----------

TYPHOON SALLY 21-29 SEP 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG.	DISTANCE	48 HR. ERROR DEG.	DISTANCE
211200Z	11.0N	156.2E	-------		-------	
211800Z	11.6N	154.7E	-------		-------	
220000Z	12.3N	153.1E	-------		-------	
220600Z	12.7N	151.3E	-------		-------	
221200Z	12.6N	149.7E	-------		-------	
NO WARNINGS ISSUED 221200Z TO 250600Z.						
250600Z	18.1N	134.9E	-------		-------	
251200Z	18.6N	133.9E	-------		-------	
251800Z	19.2N	132.9E	-------		-------	
260000Z	19.8N	132.1E	-------		-------	
260600Z	20.3N	131.2E	-------		-------	
261200Z	20.7N	130.4E	-------		-------	
261800Z	21.1N	129.6E	-------		-------	
270000Z	21.5N	128.6E	-------		-------	
270600Z	21.9N	127.2E	355	158	-------	
271200Z	22.1N	125.7E	017	168	-------	
271800Z	22.3N	124.1E	039	204	-------	
280000Z	22.3N	122.6E	080	289	-------	
280600Z	22.6N	120.9E	064	303	030	404
281200Z	22.5N	118.8E	065	198	044	510
281800Z	22.5N	117.0E	051	249	050	592
290000Z	22.6N	115.2E	076	192	077	627
290600Z	22.5N	113.6E	039	244	062	736
291200Z	22.3N	112.0E	063	136	055	530
291800Z	21.7N	110.8E	029	181	046	621

AVERAGE 24 HOUR ERROR 211 MI
AVERAGE 48 HOUR ERROR 574 MI


24 HR FORECAST POSITS
TYPHOON SALLY
21-29 SEPTEMBER 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
29/00Z
28/00Z
27/00Z
26/00Z
22/00Z
SHANGHAI
HONG KONG
MANILA
SAIGON
OKINAWA
CHICHI JIMA
SAIPAN
GUAM
YAP
ULITHI
KOROR
WOLEAI ATOLL
TRUK
PONAPE
FUMATAHACHI

O. TYPHOON TILDA (270600Z SEPTEMBER - 050600Z OCTOBER 1961)

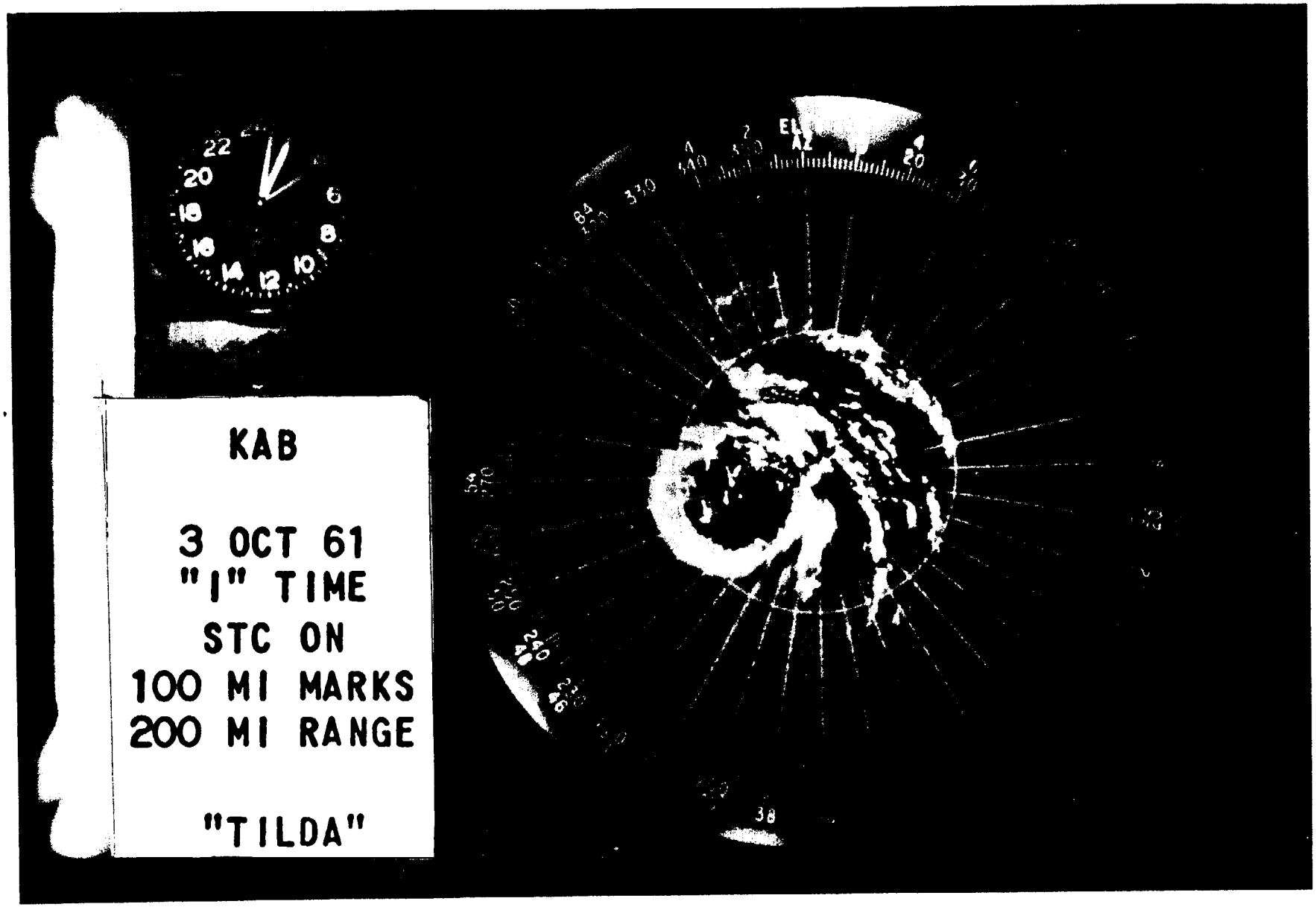
AT 260600Z A SHIP 300 MI E OF GUAM REPORTED NW SURFACE WINDS AND A 1003.5 MB SLP PROVIDING THE FIRST INDICATION OF THE CIRCULATION THAT WAS TO BECOME TYPHOON TILDA. THE CENTER BECAME MORE WELL DEFINED AND MOVED TOWARD THE WNW. THE FIRST TROPICAL DEPRESSION WARNING WAS ISSUED AT 270600Z AND THE SYSTEM WAS UPGRADED TO A TROPICAL STORM AT 271800Z. POST ANALYSIS SHOWS THAT TILDA WAS ALREADY A TROPICAL STORM AT 270600Z AND REACHED TYPHOON INTENSITY AT 271200Z.

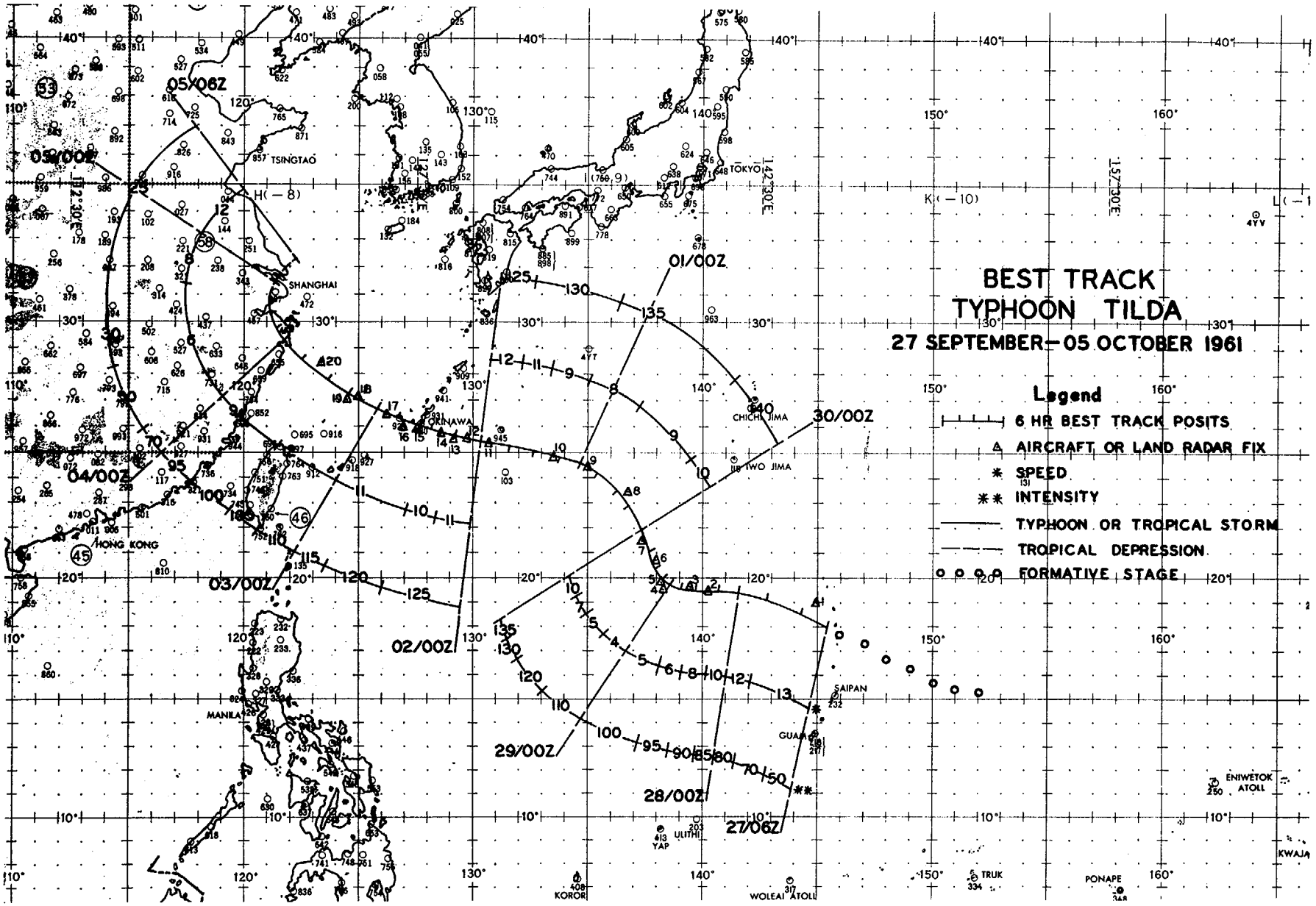
TILDA STARTED A SHARP TURN TOWARD THE N AT 290000Z AND HEADED DIRECTLY TOWARDS CENTRAL JAPAN AND AN AREA OF HIGH PRESSURE WHICH EXTENDED FROM THE SURFACE UP THROUGH 100 MB. IT WAS MANEUVERS SUCH AS THIS THAT CAUSED THE "PACIFIC STARS AND STRIPES" TO HEADLINE TILDA AS "FICKLE" AND STATE THAT SHE "ZIG-ZAGGED" HER WAY THROUGH THE PACIFIC. AS THE HIGH OVER JAPAN STARTED TO WEAKEN AND A BREAK DEVELOPED IN THE RIDGE LINE, TILDA STARTED A TURN BACK TOWARDS THE W. SHE ATTAINED HER MAXIMUM INTENSITY AT THIS TIME, REACHING 140 KTS BETWEEN 300000Z AND 301200Z. A FAST MOVING TROUGH IN THE WESTERLIES PASSED N OF TILDA AT APPROXIMATELY 301200Z, BUT APPARENTLY HAD NO EFFECT ON HER TRACK AS SHE CONTINUED TURNING TOWARD THE W. TILDA COMPLETED HER TURN AT ABOUT 010600Z AND MOVING SLIGHTLY N OF W, PASSED WITHIN 15 MI OF THE SOUTHERN TIP OF OKINAWA AT APPROXIMATELY 021400Z. KADENA WAS DIRECTLY UNDER THE WALL CLOUD AT THE TIME OF TYPHOON PASSAGE AND RECEIVED THE BRUNT OF THE TYPHOON WINDS. THE WINDS WERE 70 KTS SUSTAINED WITH PEAK GUSTS TO 108 KTS. THE SLP REACHED A MINIMUM OF 947.0 MB. NOHA, JUST INSIDE THE WALL CLOUD, HAD SUSTAINED WINDS OF 75 KTS WITH PEAK GUSTS OF 103 KTS AND A MINIMUM SLP OF 942.7 MB. SHE HAD WEAKENED SLIGHTLY, BUT STILL HAD 120 KT SURFACE WINDS AT THIS TIME. AFTER PASSING OKINAWA, TILDA STARTED A GRADUAL TURN TOWARD THE N AND CONTINUED TO SLOWLY DECREASE IN INTENSITY. SHE ENTERED THE ASIATIC MAINLAND APPROXIMATELY 100 MI S OF SHANGHAI AND STARTED TO WEAKEN RAPIDLY. SHE FINALLY CROSSED N OF THE SUBTROPICAL RIDGE LINE AND CAME UNDER THE INFLUENCE OF THE WESTERLIES. SHE THEN RECURVED SHARPLY AND EMERGED FROM THE MAINLAND JUST N OF SHANGHAI AFTER HAVING WEAKENED TO ONLY 25 KTS. THE FINAL WARNING WAS ISSUED AT 050600Z.

TILDA WAS CONSIDERED UNUSUAL BECAUSE OF HER FAILURE TO CONFORM TO CLIMATOLOGY AND HER RELUCTANCE TO FOLLOW NORMAL FORECASTING RULES. SHE TRAVELED 1775 MI IN 8 DAYS AT AN AVERAGE SPEED OF 9.2 KTS. HER MAXIMUM SPEED WAS 13 KTS FROM 270600Z TO 271800Z AND THE MINIMUM SPEED OF 4 KTS OCCURRED DURING THE ERRATIC TURN ON 29 SEPTEMBER 1961.

TILDA CAUSED DAMAGE TO OKINAWA AND POSSIBLY TO THE ASIATIC MAINLAND S OF SHANGHAI. THE TYPHOON WAS RESPONSIBLE FOR THE DEATH OF AT LEAST 11 PEOPLE, MANY INJURED AND DAMAGE IN EXCESS OF 6 MILLION DOLLARS TO CROPS, HOUSING AND EQUIPMENT, BOTH MILITARY AND CIVILIAN ON OKINAWA. A HOUSE IN NAHA WAS BLOWN FROM ITS FOUNDATIONS TO A POINT 300 FEET AWAY, KILLING THE FOUR OCCUPANTS, CERTAINLY AN EXAMPLE OF THE FURY OF TILDA. OPERATION TIEN BING (SKY SOLDIER)

WAS CALLED OFF ON TAIWAN BECAUSE OF THE TYPHOON. THE LEBANESE MERCHANT VESSEL, SHEIK, MANNED BY A GREEK CREW WENT AGROUND ON KITA DAITO SHIMA, 200 MI E OF OKINAWA AS A RESULT OF THE TYPHOON, CAUSING THE LOSS OF LIFE OF THE CAPTAIN AND ENGINEERING OFFICER. THE SHIP BROKE IN TWO BECAUSE OF THE HEAVY SEAS AFTER BEING DRIVEN AGROUND. THIS SHIP WAS JOINED A FEW DAYS LATER BY THE PIONEER MUSE, AS A RESULT OF VIOLET.


KAB
3 OCT 61
"I" TIME
STC ON
100 MI MARKS
200 MI RANGE
"TILDA"


BEST TRACK
TYPHOON TILDA
27 SEPTEMBER–05 OCTOBER 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT OR LAND RADAR FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
05/06Z
04/00Z
03/00Z
02/00Z
01/00Z
30/00Z
29/00Z
28/00Z
27/06Z
TSINGTAO
SHANGHAI
TOKYO
CHICHI JIMA
IWO JIMA
OKINAWA
HONG KONG
MANILA
SAIPAN
GUAM
YAP
ULITHI
KOROR
WOLEAI ATOLL
TRUK
PONAPE
ENIWETOK ATOLL
KWAJA

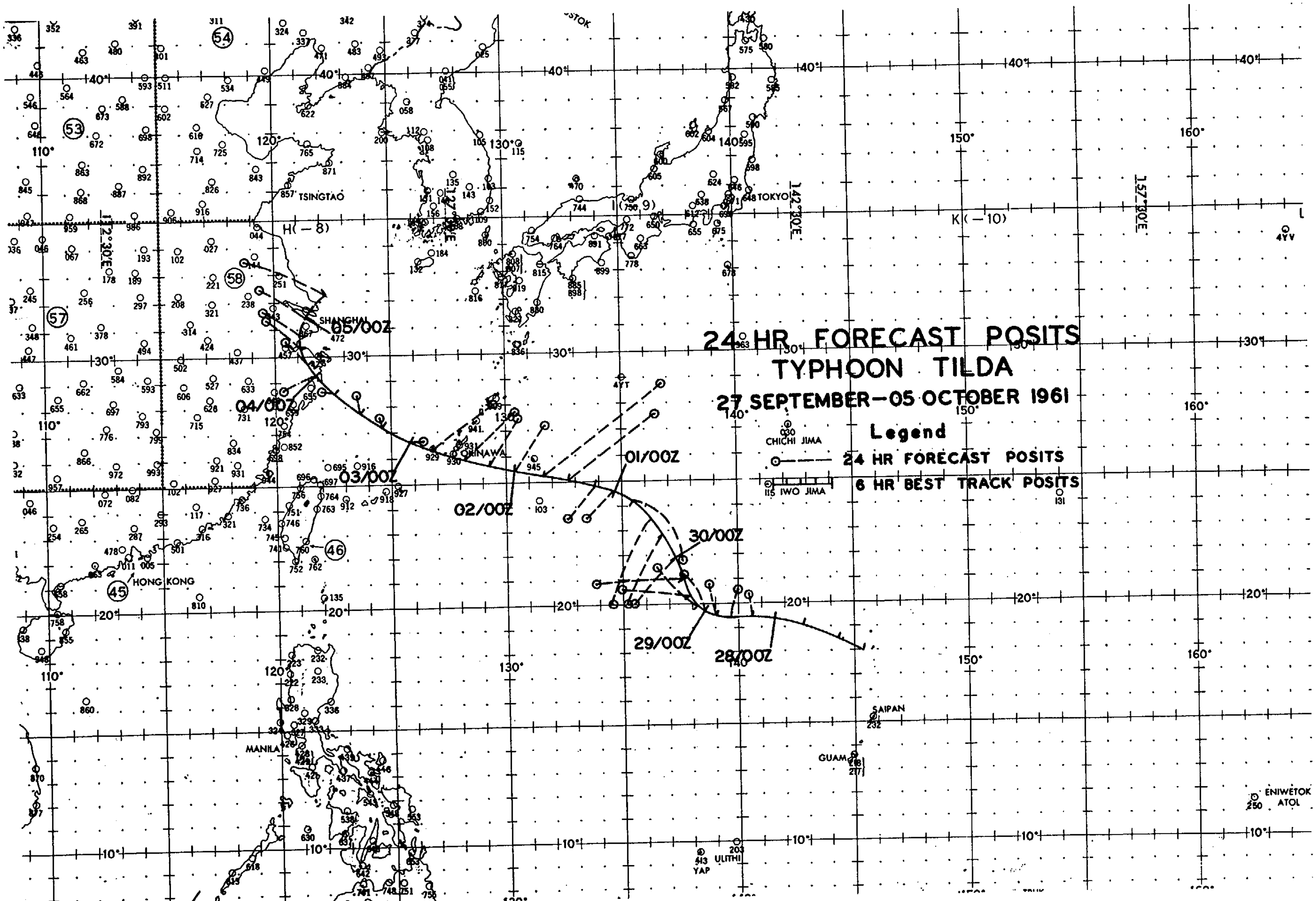
LAND RADAR AND AIRCRAFT FIXES - TYPHOON TILDA

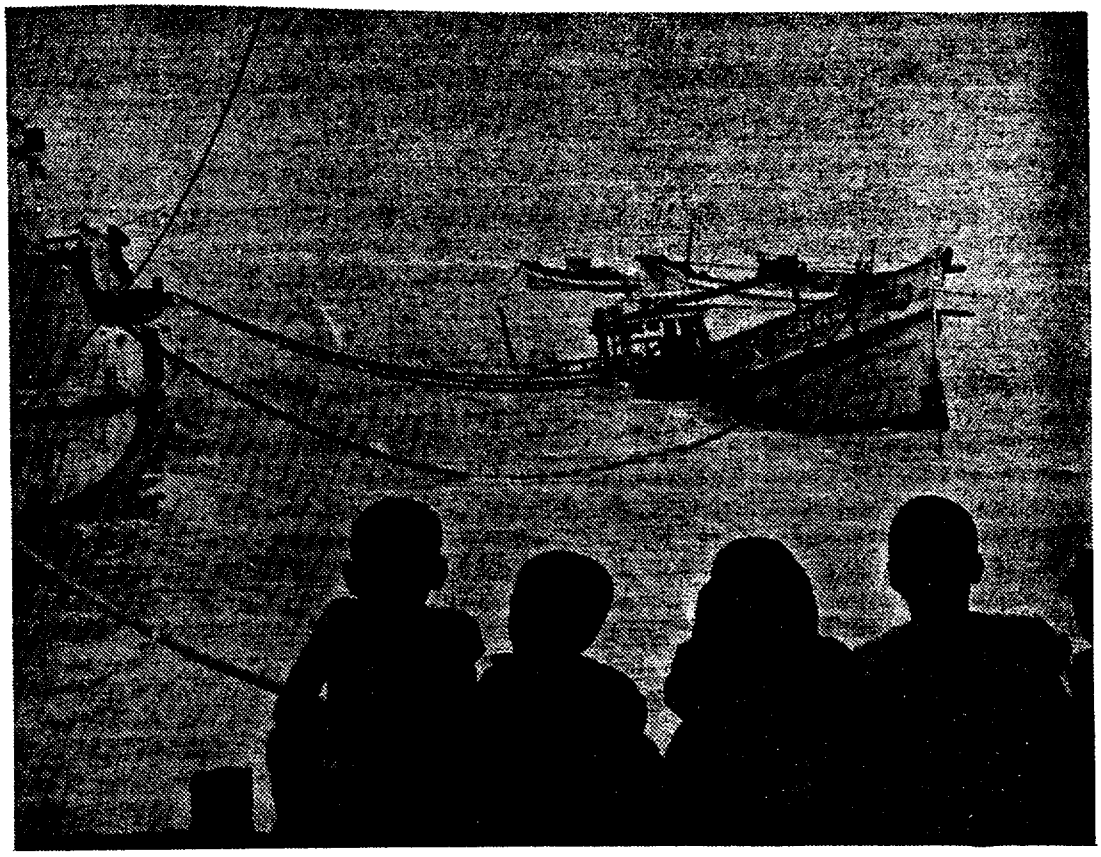
FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
1	270603Z	19.0N	145.0E	VAP61-P-U	---	---	----	---	-----	----------
2	280845Z	19.5N	140.2E	VW1-R-03	---	---	----	---	-----	CIRC 12 MI DIA
3	281333Z	19.7N	139.5E	USOA-R-U	---	---	----	---	-----	15 MI DIA
4	290041Z	19.5N	138.3E	VW1-P-10	---	---	----	---	-----	CIRC 14 MI DIA
5	290420Z	19.8N	138.2E	VW1-P-10	---	---	9055	---	-----	CIRC 14 MI DIA
6	291412Z	20.7N	138.0E	VW1-R-10	---	---	----	---	-----	DIA 13 MI
7	292120Z	21.6N	137.3E	56-P-01	100	---	7980	917	19/17	40 MI DIA
8	300800Z	23.4N	136.9E	VW1-R-05	---	---	----	---	-----	40 MI DIA
9	302135Z	24.5N	135.0E	VW1-R-05	---	---	----	---	-----	CIRC 37 MI DIA
10	010800Z	24.9N	133.5E	VW1-R-05	---	---	----	---	-----	30 MI DIA
11	012210Z	25.3N	130.7E	56-P-03	120	105	8240	935	16/16	CIRC 20 MI DIA
12	020300Z	25.5N	129.8E	LND/RDR	---	---	----	---	-----	----------
13	020600Z	25.6N	129.1E	LND/RDR	---	---	----	---	-----	----------
14	020900Z	25.7N	128.7E	LND/RDR	---	---	----	---	-----	----------
15	021330Z	25.9N	127.6E	LND/RDR	---	---	----	---	-----	DIA 70 MI
16	021700Z	26.0N	127.0E	LND/RDR	---	---	----	---	-----	----------
17	022230Z	26.4N	126.1E	56-P-05	70	120	8470	944	17/17	CIRC 85 MI DIA
18	030300Z	27.1N	125.0E	LND/RDR	---	---	----	---	-----	----------
19	030555Z	27.0N	124.5E	LND/RDR	---	---	----	---	-----	----------
20	031510Z	28.4N	123.2E	VW1-R-10	---	---	----	---	-----	40 MI DIA

TYPHOON TILDA 27 SEP-05 OCT 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG. DISTANCE	48 HR. ERROR DEG. DISTANCE
270600Z	18.0N	145.4E	-------	-------
271200Z	18.6N	144.2E	-------	-------
271800Z	19.1N	142.9E	-------	-------
280000Z	19.4N	141.7E	-------	-------
280600Z	19.6N	140.7E	-------	-------
281200Z	19.6N	139.8E	-------	-------
281800Z	19.7N	139.1E	345-74	-------
290000Z	19.8N	138.6E	327-98	-------
290600Z	20.0N	138.3E	210-129	-------
291200Z	20.4N	138.0E	273-169	-------
291800Z	21.1N	137.7E	267-215	287-224
300000Z	22.0N	137.3E	223-165	276-254
300600Z	22.9N	136.8E	207-196	269-296
301200Z	23.7N	136.2E	203-239	242-295
301800Z	24.3N	135.4E	140-192	243-378
010000Z	24.6N	134.7E	222-89	217-311
010600Z	24.8N	133.8E	219-101	211-306
011200Z	25.1N	132.8E	058-256	208-309
011800Z	25.2N	131.7E	052-358	113-292
020000Z	25.4N	130.3E	037-127	236-134
020600Z	25.6N	129.1E	033-139	203-94
021200Z	25.8N	128.1E	050-170	053-720
021800Z	26.1N	126.9E	049-179	057-855
030000Z	26.5N	125.8E	063-27	056-505
030600Z	27.1N	124.7E	343-36	059-633
031200Z	27.8N	123.7E	351-35	068-520
031800Z	28.7N	122.6E	271-35	033-356
040000Z	29.3N	121.9E	245-96	112-41
040600Z	29.8N	121.5E	305-73	343-47
041200Z	30.3N	121.1E	306-97	332-62
041800Z	30.9N	120.9E	302-86	307-104
050000Z	31.6N	121.2E	301-111	260-213
050600Z	32.3N	122.2E	290-195	301-226

AVERAGE 24 HOUR ERROR 137 MI
AVERAGE 48 HOUR ERROR 312 MI


24 HR FORECAST POSITS
TYPHOON TILDA
27 SEPTEMBER—05 OCTOBER 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
05/00Z
04/00Z
03/00Z
02/00Z
01/00Z
30/00Z
29/00Z
28/00Z
SHANGHAI
TSINGTAO
OKINAWA
HONG KONG
MANILA
TOKYO
CHICHI JIMA
IWO JIMA
SAIPAN
GUAM
ULITHI
YAP
ENIWETOK ATOL



CHILDREN LOOK AT OLD SHIP THAT BATTLED TILDA AND LOST. OCTOBER 1961. (PACIFIC STARS AND STRIPES)

VIOLENT WIND AND HEAVY RAINS BATTER OKINAWA AS TILDA PASSES OKINAWA, OCTOBER 1961. (PACIFIC STARS AND STRIPES)

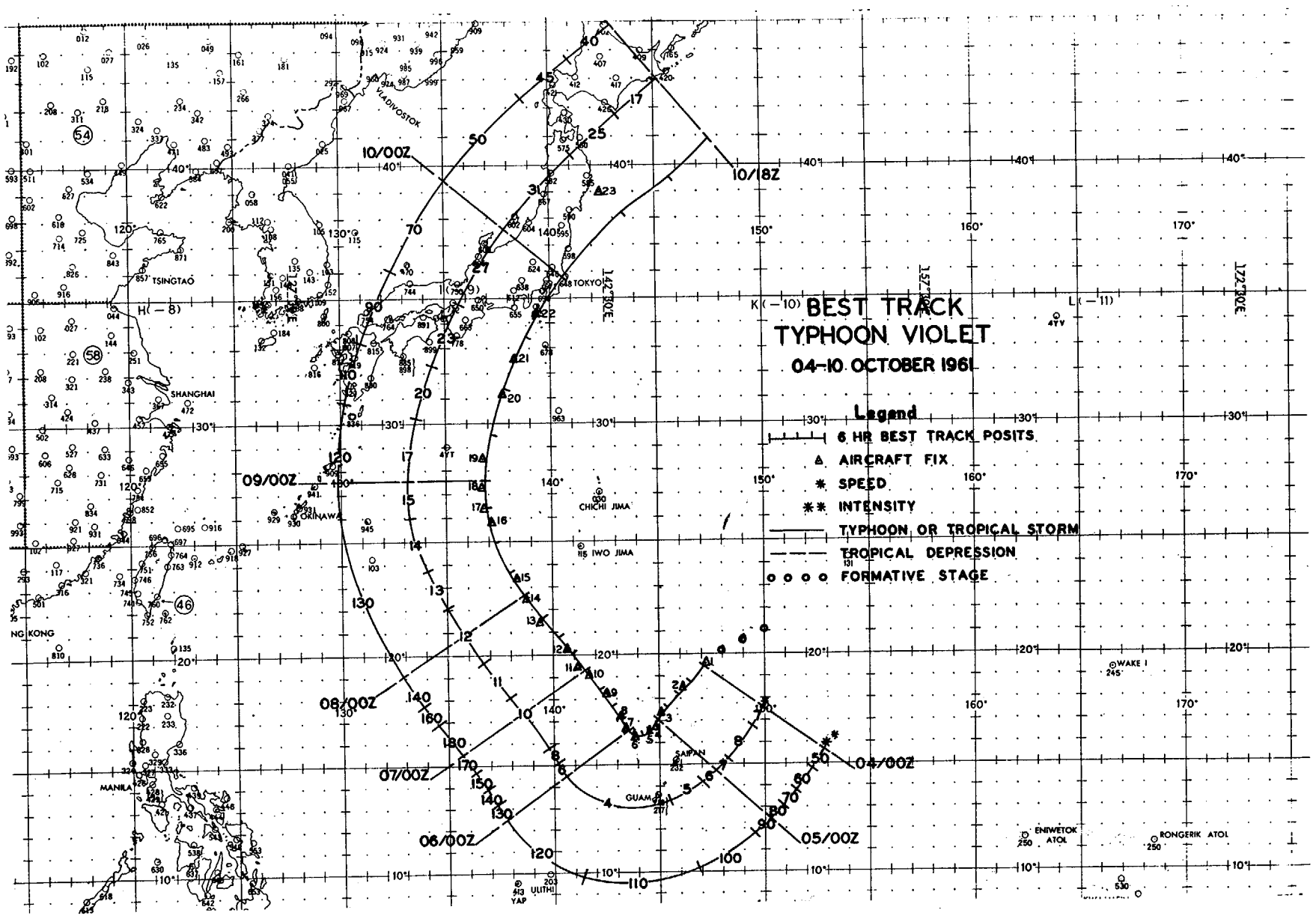
P. TYPHOON VIOLET (040000Z-101800Z OCTOBER 1961)

WHILE TYPHOON TILDA WAS MOVING TOWARD OKINAWA, A SMALL CIRCULATION BEGAN TO APPEAR SW OF MARCUS ISLAND, AND BY 021800Z IT WAS WELL ENOUGH DEFINED TO MERIT A REQUEST FOR AN INVESTIGATION. BASED ON A REPORTED SURFACE WIND OF 45 KTS, THE FIRST TROPICAL STORM VIOLET WARNING WAS ISSUED AT 040000Z.

AT THIS TIME A RIDGE WITH A N-S ORIENTATION WAS LOCATED W OF VIOLET, MIDWAY BETWEEN THE TWO TYPHOONS, VIOLET AND TILDA. AT FIRST VIOLET WAS UNABLE TO TRAVERSE THIS RIDGE WHICH EXTENDED FROM THE SURFACE THROUGH 500 MB. INSTEAD SHE MOVED TOWARD THE SW AND INTENSIFIED, REACHING TYPHOON STRENGTH AT APPROXIMATELY 041200Z. DURING HER INTENSIFICATION PROCESS VIOLET ALSO EXTENDED VERTICALLY, BECOMING DEFINITELY CLOSED AT THE 300 MB LEVEL AT 051200Z. AT THE SAME TIME, A SMALL OUTDRAFT APPEARED ON THE 200 MB MAP IMMEDIATELY SE OF VIOLET AND RESULTED IN THE FORMATION OF A NEUTRAL POINT AT THE SAME LEVEL DIRECTLY OVER THE TYPHOON'S CENTER. VIOLET THEN DECELERATED SLIGHTLY AND STARTED AN ABRUPT TURN TOWARD THE NW AS THE SUBTROPICAL RIDGE SHIFTED TO THE E. VIOLET CONTINUED TO INTENSIFY, REACHING HER MAXIMUM STRENGTH OF 180 KTS FROM 070000Z TO 071200Z. SHE THEN STARTED TO WEAKEN SLIGHTLY AND CONTINUED TO THE NNW, RECURVING THROUGH THE RIDGE LINE AT ABOUT 28N. SHE CONTINUED TO FOLLOW A SMOOTH PARABOLIC TRACK AND CROSSED THE BOSO PENINSULA 30 MI E OF TOKYO AT ABOUT 092200Z. SHE WAS MOVING AT A SPEED OF 27 KTS AT THIS TIME AND STILL HAD MAXIMUM SUSTAINED SURFACE WINDS OF 70 KTS. AFTER HER BRUSH WITH LAND, VIOLET RAPIDLY COMMENCED TO ASSUME EXTRATROPICAL CHARACTERISTICS. THE FINAL WARNING WAS ISSUED AT 101800Z WHEN SHE HAD WEAKENED TO 40 KTS.

VIOLET WAS UNUSUAL IN THAT SHE MOVED STEADILY TOWARD THE SW FOR AT LEAST ONE AND ONE HALF DAYS, BUT OTHER THAN THAT, SHE WAS QUITE NORMAL. SHE TRAVELED 2050 MI IN THE 6 DAYS AND 18 HOURS THAT WARNINGS WERE BEING ISSUED. HER MINIMUM SPEED WAS 4 KTS WHEN SHE MADE THE TURN FROM A HEADING OF SW TO THE NW AND HER MAXIMUM SPEED OF 31 KTS OCCURRED AFTER SHE PASSED TOKYO.

AS VIOLET APPROACHED GUAM FROM THE NE, LITTLE DAMAGE OCCURRED EXCEPT FOR SLIGHT CROP DAMAGE AND SOME NERVOUSNESS AMONG THE OCCUPANTS OF THE ISLAND. AFTER IT COMMENCED MOVING TO THE NW A MERCHANT VESSEL, THE PIONEER MUSE, WAS GROUNDED ON KITA DAITO SHIMA, ONLY A FEW MILES FROM THE SHEIK, AND BROKE IN TWO THE FOLLOWING DAY DUE TO HEAVY SEAS. THE CREW OF THE PIONEER MUSE WAS RESCUED BY THE AMPHIBIOUS ASSAULT SHIP PRINCETON VIA HELICOPTER. ONLY MINOR DAMAGE OCCURRED TO JAPAN IN THE TOKYO AREA, DUE TO GUSTY WINDS. TWO DEATHS WERE ATTRIBUTED TO THE TYPHOON IN JAPAN.


BEST TRACK
TYPHOON VIOLET
04-10 OCTOBER 1961
Legend
6 HR BEST TRACK POSITS.
AIRCRAFT FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
10/00Z
10/18Z
09/00Z
08/00Z
07/00Z
06/00Z
05/00Z
04/00Z
TSINGTAO
SHANGHAI
TOKYO
OKINAWA
CHICHI JIMA
IWO JIMA
SAIPAN
GUAM
WAKE I
ENIWETOK ATOL
RONGERIK ATOL
ULITHI
YAP
MANILA
NG KONG
VLADIVOSTOK
142°30E
157°30E
172°30E

LAND RADAR AND AIRCRAFT FIXES.- TYPHOON VIOLET

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
1	032130Z	19.5N	147.2E	VW1-P-10	45	---	----	997	-----	POORLY DEFINED
2	040845Z	18.6N	146.1E	VW1-P-10	45	---	----	---	-----	DEFINED BY SPIRAL BANDS
3	042100Z	17.3N	145.1E	56-P-01	85	70	9860	975	15/08	CIRC DIA 25MI WALL CLDS ALL QUADS
4	050200Z	16.9N	144.9E	56-P-03	110	70	9740	972	16/11	DIA 29MI
5	050700Z	16.7N	144.5E	56-P-03	110	62	9560	970	16/11	CIRC DIA 20 MI
6	051245Z	16.2N	143.9E	VW1-R-03	---	---	----	---	-----	DIA 15MI
7	060300Z	16.7N	143.4E	56-P-03	65	65	9000	946	15/10	CIRC 16MI DIA
8	060630Z	17.2N	143.2E	56-P-02	100	75	8670	946	17/12	DIA 5 MI
9	061330Z	18.2N	142.6E	VW1-R-05	---	---	----	---	-----	DIA 11 MI
10	062130Z	19.1N	141.8E	56-P-02	190	170	7340	898	25/19	WALL CLDS ALL QUADS
11	070200Z	19.6N	141.2E	56-P-02	190	160	7260	894	27/21	CIRC 5MI DIA WELL DEFINED
12	070700Z	20.2N	140.8E	56-P-02	190	160	7130	882	29/23	RADAR EYE DIA 10MI
13	071358Z	21.5N	139.4E	VW1-R-10	---	---	----	---	-----	CIRC DIA 9 MI
14	072200Z	22.5N	138.9E	56-P-05	125	115	7350	908	21/15	CIRC DIA 9 MI
15	080400Z	23.4N	138.3E	56-P-02	125	110	7580	916	17/15	WELL DEFINED CIRC DIA 12 MI
16	081330Z	25.9N	137.1E	VW1-R-05	---	---	----	---	-----	CIRC DIA 10 MI
17	081515Z	26.2N	136.9E	VW1-R-05	---	---	----	---	-----	CIRC DIA 8 MI
18	082145Z	27.2N	136.7E	56-P-03	125	115	8010	930	17/16	CIRC DIA 10 MI
19	090300Z	28.5N	136.8E	56-P-02	130	90	8250	940	19/15	CIRC DIA 10 MI OPEN S & W
20	091150Z	31.2N	137.9E	VW1-R-10	---	---	----	---	-----	INDEFINITE 28 MI DIA
21	091500Z	32.7N	138.3E	VW1-R-10	---	---	----	---	-----	CIRC 20 MI DIA

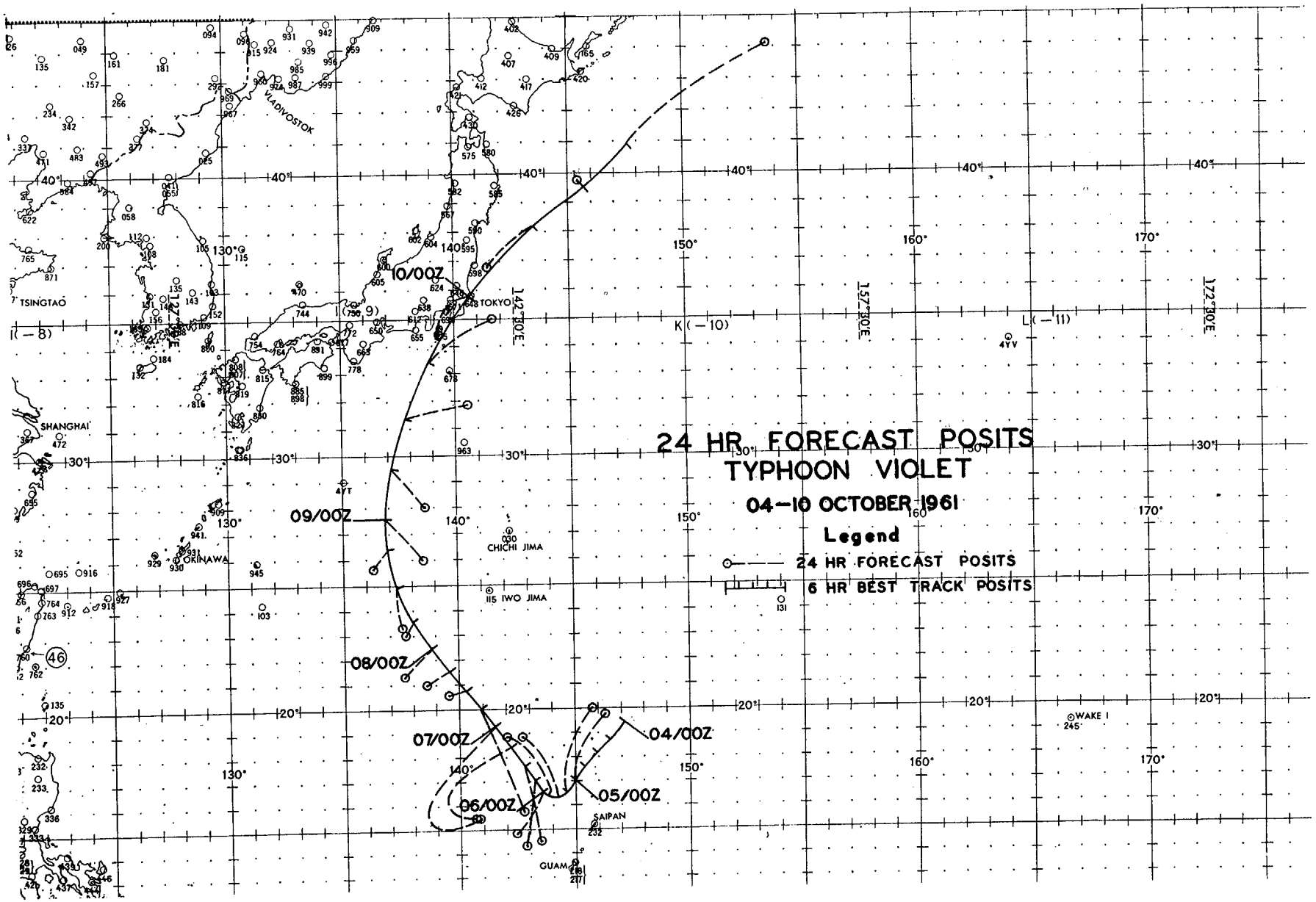
LAND RADAR AND AIRCRAFT FIXES - TYPHOON VIOLET (CONT'D)

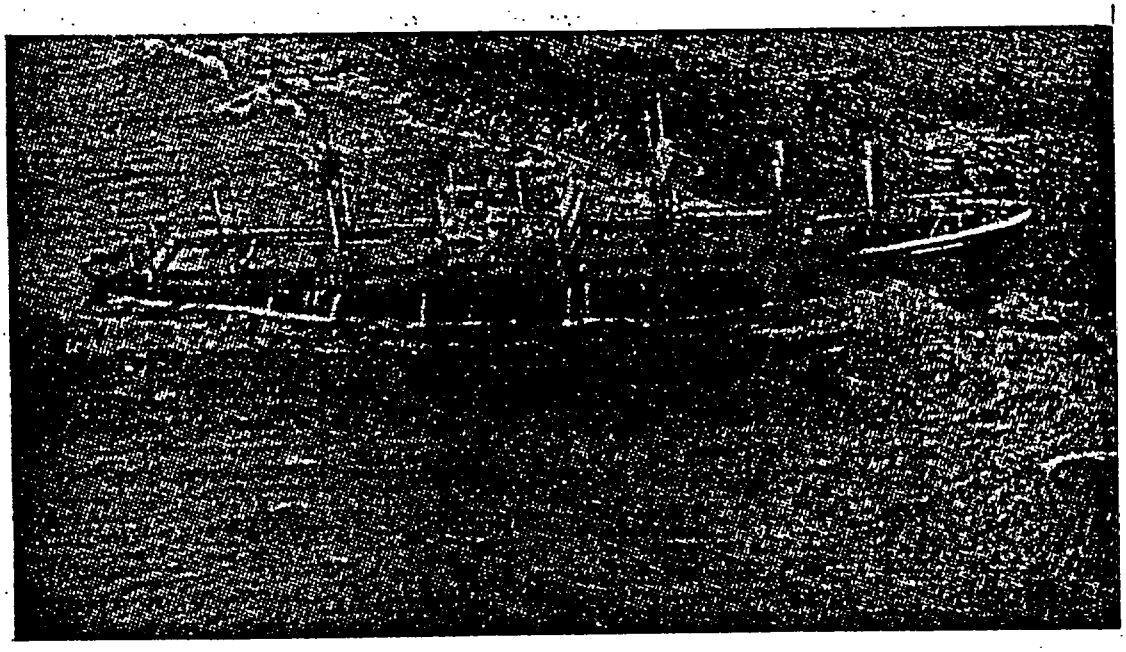
FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
22	092130Z	34.3N	139.5E	56-P-01	80	40	9380	973	18/08	NO WALL CLDS
23	100700Z	39.0N	142.3E	56-P-02	100	80	9850	---	16/12	POORLY DEFINED

TYPHOON VIOLET 04-10 OCT 1961
POSITION AND FORECAST VERIFICATION DATA

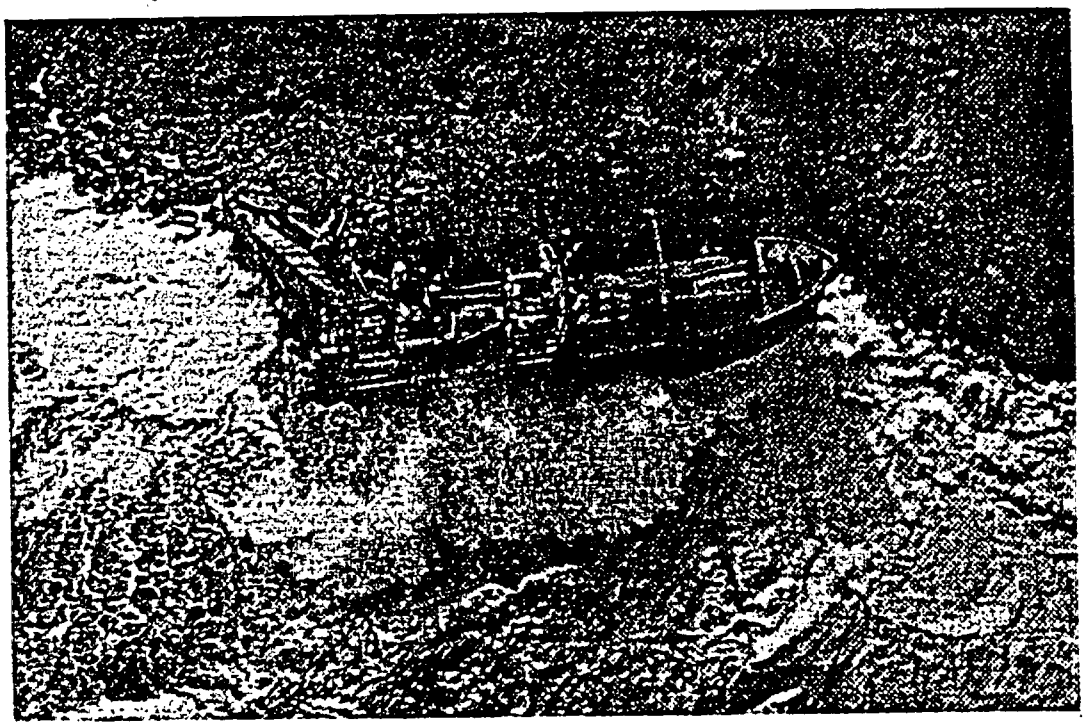
DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG. DISTANCE	48 HR. ERROR DEG. DISTANCE
040000Z	19.4N	147.0E	-------	-------
040600Z	18.8N	146.4E	-------	-------
041200Z	18.3N	145.8E	-------	-------
041800Z	17.6N	145.4E	-------	-------
050000Z	17.1N	144.9E	025-175	-------
050600Z	16.6N	144.7E	019-204	-------
051200Z	16.3N	144.1E	333-172	-------
051800Z	16.3N	143.7E	329-180	-------
060000Z	16.5N	143.5E	210-117	015-235
060600Z	17.1N	143.2E	187-170	359-210
061200Z	17.8N	142.8E	172-195	302-145
061800Z	18.6N	142.2E	207-207	294-186
070000Z	19.4N	141.4E	190-235	205-315
070600Z	20.1N	140.9E	157-275	185-365
071200Z	20.9N	140.1E	227-35	171-415
071800Z	21.8N	139.4E	218-65	198-375
080000Z	22.7N	138.7E	210-112	194-442
080600Z	23.8N	137.9E	197-55	171-510
081200Z	25.0N	137.4E	172-110	150-220
081800Z	26.4N	136.8E	223-55	205-290
090000Z	27.8N	136.7E	142-142	200-325
090600Z	29.6N	137.1E	136-120	190-180
091200Z	31.5N	137.8E	078-137	192-325
091800Z	33.6N	138.9E	057-160	194-255
100000Z	35.8N	140.8E	219-112	173-335
100600Z	38.2N	143.3E	049-120	169-340
101200Z	39.7N	145.8E	290-22	050-330
101800Z	41.0N	147.3E	057-335	060-435

AVERAGE 24 HOUR ERROR 146 MI
AVERAGE 48 HOUR ERROR 312 MI


24 HR FORECAST POSITS
TYPHOON VIOLET
04–10 OCTOBER 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
10/00Z
09/00Z
08/00Z
07/00Z
06/00Z
05/00Z
04/00Z
VLADIVOSTOK
TSINGTAO
SHANGHAI
OKINAWA
CHICHI JIMA
IWO JIMA
TOKYO
SAIPAN
GUAM
WAKE I
142°30'E
157°30E
172°30E



SHIPPING DAMAGE: THE PIONEER MUSE RAN AGROUND OF KITA DIATO SHIMA AS A RESULT OF TYPHOON VIOLET, OCTOBER, 1961. (RELEASED BY PACIFIC STARS AND STRIPES, 14 OCT 61)



SHEIK IS BROKEN IN TWO AFTER RUNNING AGROUND ON KITA DIATO SHIMA, OCTOBER 1961. (RELEASED BY PACIFIC STARS AND STRIPES, 14 OCT 61)

Q. TYPHOON BILLIE (230000Z-280600Z OCTOBER 1961)

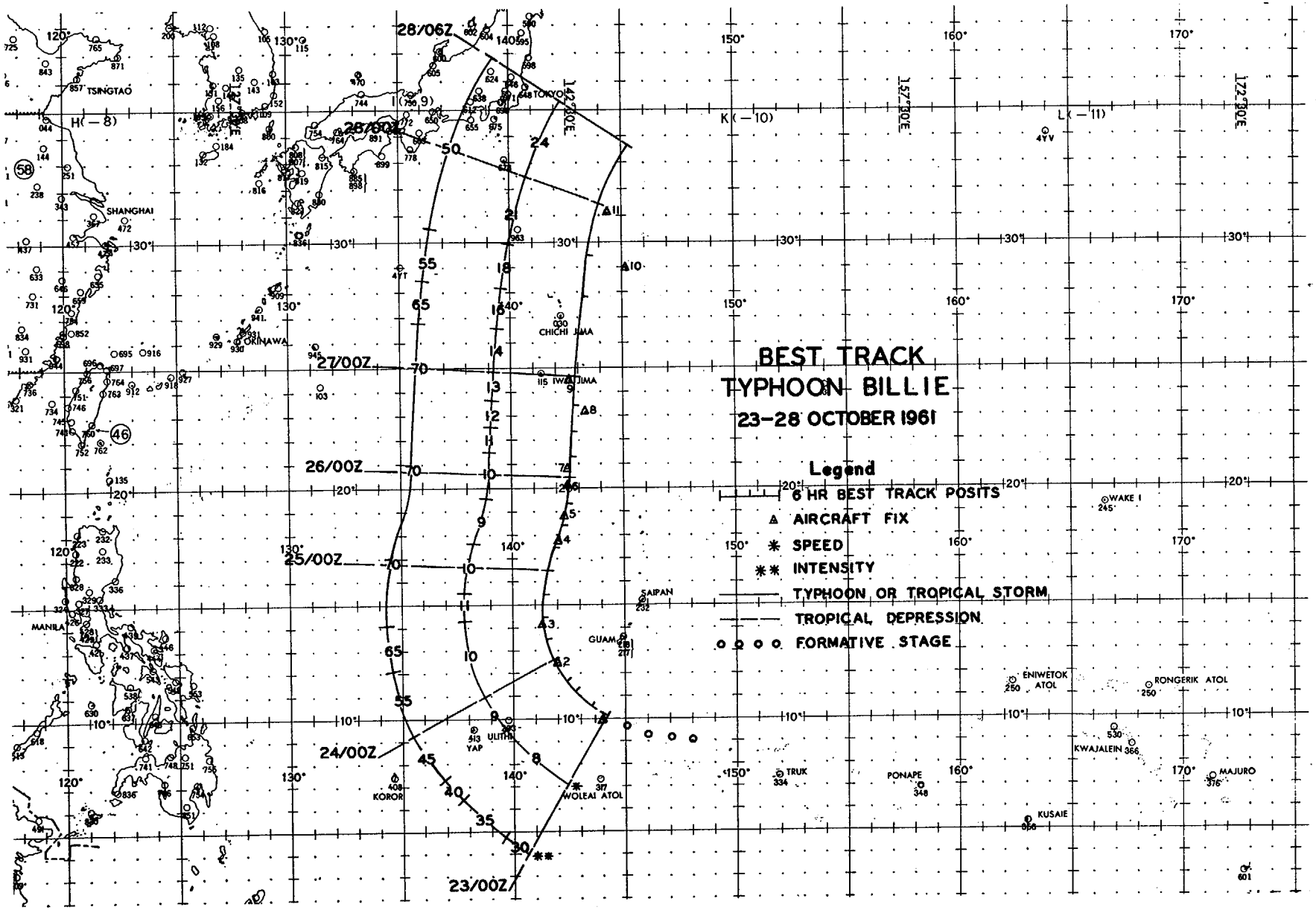
FOR SEVERAL DAYS PRIOR TO 23 OCTOBER AN EXTENSIVE AREA OF LOW PRESSURE HAD BEEN PRESENT SOUTH OF GUAM. AT TIMES IT CONTAINED AS MANY AS THREE WELL DEFINED VORTICES. ONE CENTER FINALLY BECAME PREDOMINANT AND THE ENTIRE SYSTEM STARTED TO INTENSIFY. WHEN THE FIRST TROPICAL DEPRESSION WARNING WAS ISSUED AT 230000Z THE RADIUS OF CYCLONIC WINDS ABOUT THE CENTER EXCEEDED 1000 MI.

AT 231200Z THE SYSTEM WAS UPGRADED TO TROPICAL STORM INTENSITY AND THE NAME BILLIE WAS ASSIGNED. INTENSIFICATION CONTINUED UNTIL 241200Z WHEN THE MAXIMUM SURFACE WIND SPEED OF 70 KTS WAS REACHED. BILLIE'S TRACK UP TO THIS TIME SHOWED THAT SHE HAD TURNED TO THE N FROM A HEADING OF W AND WAS DESCRIBING AN ARC ABOUT GUAM WITH A RADIUS OF ABOUT 200 MI. FOR THE NEXT THREE DAYS BILLIE MOVED IN A NORTHERLY DIRECTION WHILE MAINTAINING THE SAME INTENSITY. HER RADIUS OF CYCLONIC WINDS HAD DECREASED TO APPROXIMATELY 750 MI AND THEN REMAINED NEARLY CONSTANT THROUGHOUT THE REST OF HER TROPICAL LIFE. THE EXTENSIVE AREA ENCOMPASSED BY BILLIE'S CIRCULATION WAS MATCHED BY THE SIZE OF HER EYE WHICH WAS ALSO OF KING SIZE PROPORTIONS. NO OTHER TYPHOON OF 1961 WAS ABLE TO EQUAL HER EYE DIAMETER WHICH AT ONE TIME MEASURED 120 X 180 MI. IN THIS RESPECT AND MANY OTHERS BILLIE WAS VERY SIMILAR TO TYPHOON CARMEN OF AUGUST 1960.

BILLIE PASSED 50 MI E OF CHICHI JIMA AT APPROXIMATELY 270900Z, AND SHORTLY AFTERWARDS WEAKENED TO TROPICAL STORM INTENSITY. SHE ENCOUNTERED THE POLAR FRONT NEAR 32N AT APPROXIMATELY 280000Z AND MERGED WITH A LOW PRESSURE AREA ASSOCIATED WITH IT. THE FINAL TROPICAL WARNING WAS ISSUED AT 280600Z WHEN THE SYSTEM WAS DEFINITELY EXTRATROPICAL BUT STILL HAD 50 KT SURFACE WINDS.

BILLIE TRAVELED 1500 MI OVER A PERIOD OF 5 DAYS AND 6 HOURS, AT AN AVERAGE SPEED OF 12 KTS. THE MINIMUM SPEED WAS 8 KTS ON 23 OCTOBER AND THE MAXIMUM SPEED WAS 24 KTS ON THE 28 OCTOBER.

BILLIE DID NOT PASS OVER ANY LARGE LAND MASSES DURING ITS LIFE, THEREFORE CREATED LESS DAMAGE THAN MIGHT OTHERWISE HAVE BEEN EXPECTED. AS THE TYPHOON NEARED GUAM, A JAPANESE FREIGHTER, THE FUKAZAN MARU, A 7000 TON FREIGHTER LADEN WITH COPPER ORE FROM TOWNSVILLE, AUSTRALIA ENROUTE TO JAPAN, DEVELOPED A LEAK IN ONE OF THE HOLDS AND COMMENCED TO SINK RATHER SLOWLY. THE CREW OF 47 WERE RESCUED BY THE DOLLY TURMAN WITHOUT INCIDENT, WERE TRANSFERRED TO THE USS BRISTER, AND TRANSPORTED TO GUAM. THE TYPHOON CREATED STRONG WINDS AND CONSIDERABLE RAINFALL AT IWO JIMA AND OTHER ISLANDS BUT DAMAGE WAS NOT REPORTED.


BEST TRACK
TYPHOON BILLIE
23-28 OCTOBER 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
28/06Z
28/00Z
27/00Z
26/00Z
25/00Z
24/00Z
23/00Z
TSINGTAO
SHANGHAI
OKINAWA
CHICHI JIMA
IWO JIMA
TOKYO
SAIPAN
GUAM
MANILA
YAP
ULITHI
KOROR
WOLEAI ATOL
TRUK
PONAPE
KUSAIE
ENIWETOK ATOL
RONGERIK ATOL
KWAJALEIN
MAJURO
WAKE I
H(−8)
I(−9)
K(−10)
L(−11)
142.5°E
157.5°E
172.5°E

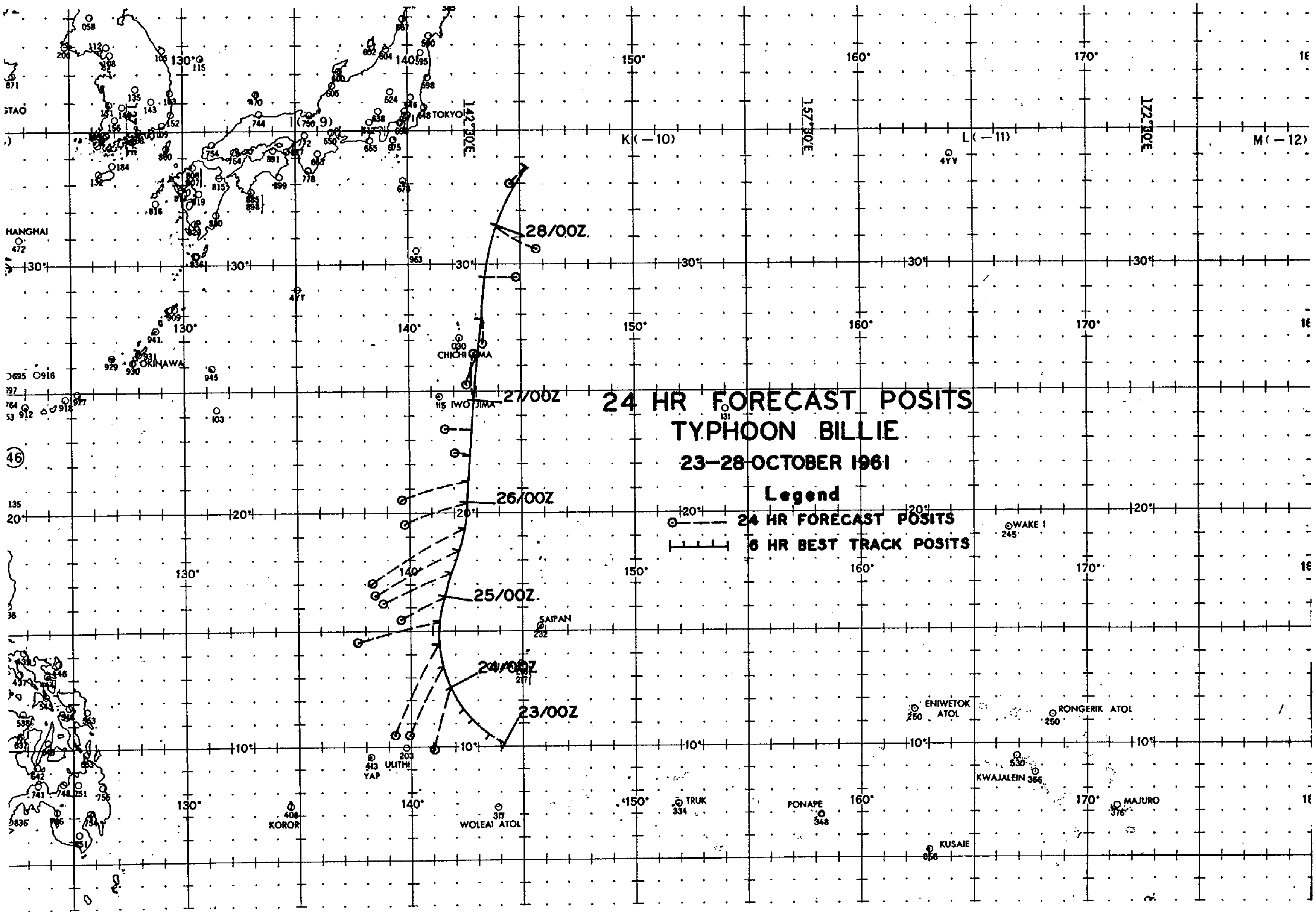
LAND RADAR AND AIRCRAFT FIXES - TYPHOON BILLIE

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/Td (°C)	EYE CHARACTERISTICS
1	222347Z	10.0N	144.0E	VW1-P-15	25	---	----	---	-----	LARGE AREA OF LIGHT AND VARIABLE WINDS
2	232240Z	12.5N	142.0E	VW1-P-10	50	---	9980	990	12/--	40 MI DIA
3	241230Z	14.1N	141.2E	VW1-R-15	---	---	----	---	-----	INDEFINITE
4	250807Z	17.9N	142.1E	VW1-P-10	---	---	----	981	-----	WALL CLDS S QUAD
5	251530Z	18.9N	142.3E	VW1-P-15	---	---	----	974	-----	CIRC 100 MI DIA
6	252316Z	20.2N	142.5E	VW1-P-10	65	---	----	972	-----	152 X 86 MI, ORIENTED 023 DEG
7	260344Z	20.9N	142.4E	VW1-P-05	---	---	9425	961	17/--	180 X 120MI, ORIENTED NNE-SSW
8	261527Z	23.1N	143.2E	VW1-P-05	---	---	9290	---	16/--	RADAR EYE 155 X 105 MI
9	262250Z	24.7N	142.7E	315-P-U	35	20	9530	---	16/--	----------
10	271615Z	29.0N	145.1E	VW1-P-20	---	40	9545	---	16/--	----------
11	272200Z	31.1N	144.3E	315-P-02	40	20	9500	965	13/--	NO DEFINITE EYE, DIA 50 MI

TYPHOON BILLIE 23-28 OCT 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG. DISTANCE	48 HR. ERROR DEG. DISTANCE
230000Z	10.2N	144.1E	-------	-------
230600Z	10.7N	143.4E	-------	-------
231200Z	11.2N	142.8E	-------	-------
231800Z	11.8N	142.3E	-------	-------
240000Z	12.6N	141.8E	-------	-------
240600Z	13.5N	141.4E	-------	-------
241200Z	14.5N	141.3E	208-277	-------
241800Z	15.6N	141.4E	250-174	-------
250000Z	16.6N	141.7E	241-241	-------
250600Z	17.6N	141.9E	243-197	-------
251200Z	18.4N	142.2E	240-236	221-594
251800Z	19.3N	142.4E	241-280	252-416
260000Z	20.4N	142.4E	252-157	243-332
260600Z	21.3N	142.6E	252-170	256-356
261200Z	22.5N	142.6E	278-37	238-405
261800Z	23.6N	142.8E	263-61	236-480
270000Z	24.8N	142.9E	183-90	244-291
270600Z	26.3N	143.0E	198-67	242-317
271200Z	27.9N	143.1E	185-62	213-135
271800Z	29.7N	143.4E	109-80	215-152
280000Z	31.8N	143.9E	128-115	093-306
280600Z	33.9N	145.1E	208-64	140-295

AVERAGE 24 HOUR ERROR 144 MI
AVERAGE 48 HOUR ERROR 340 MI

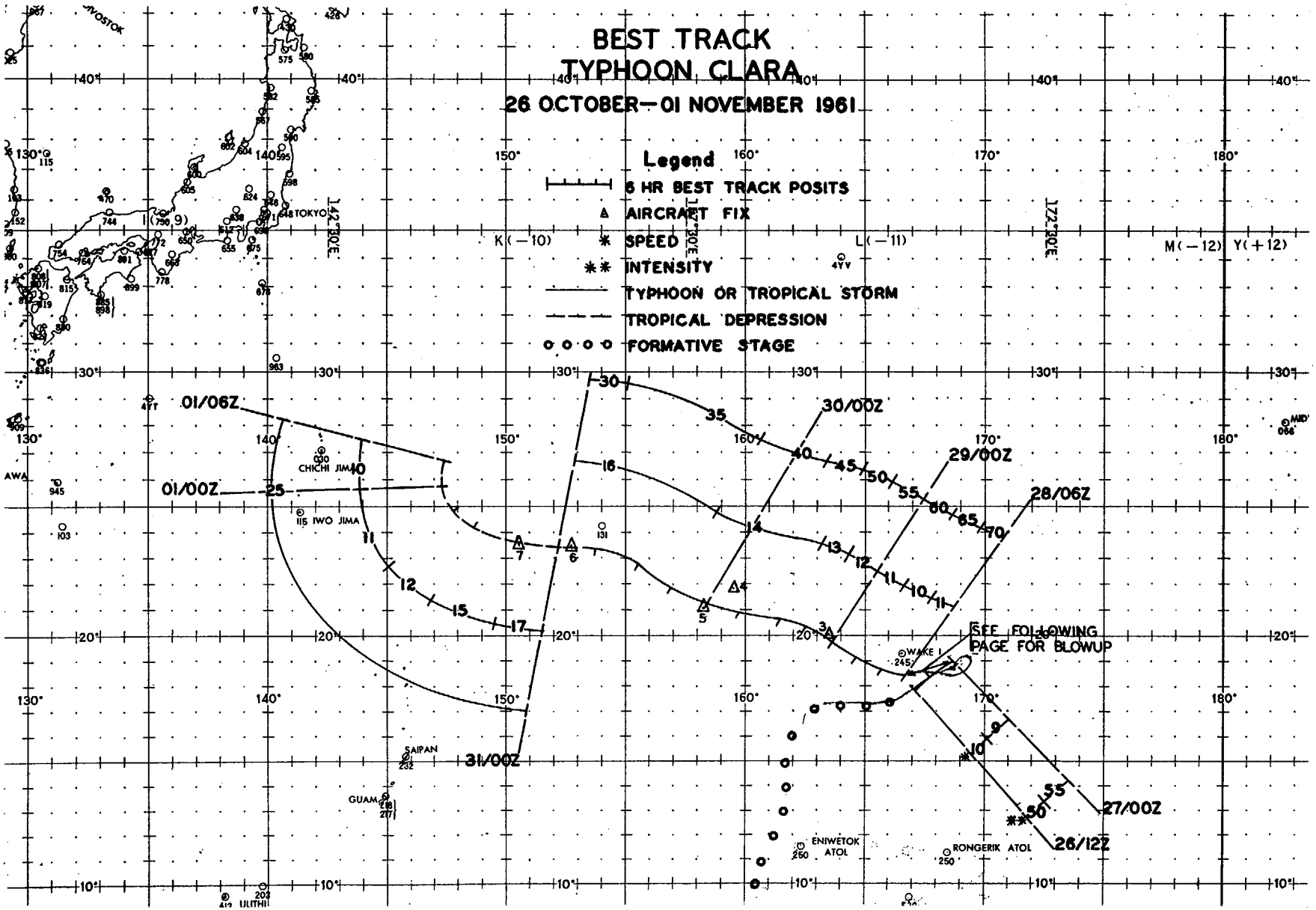

24 HR FORECAST POSITS
TYPHOON BILLIE
23–28 OCTOBER 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
28/00Z
27/00Z
26/00Z
25/00Z
24/00Z
23/00Z

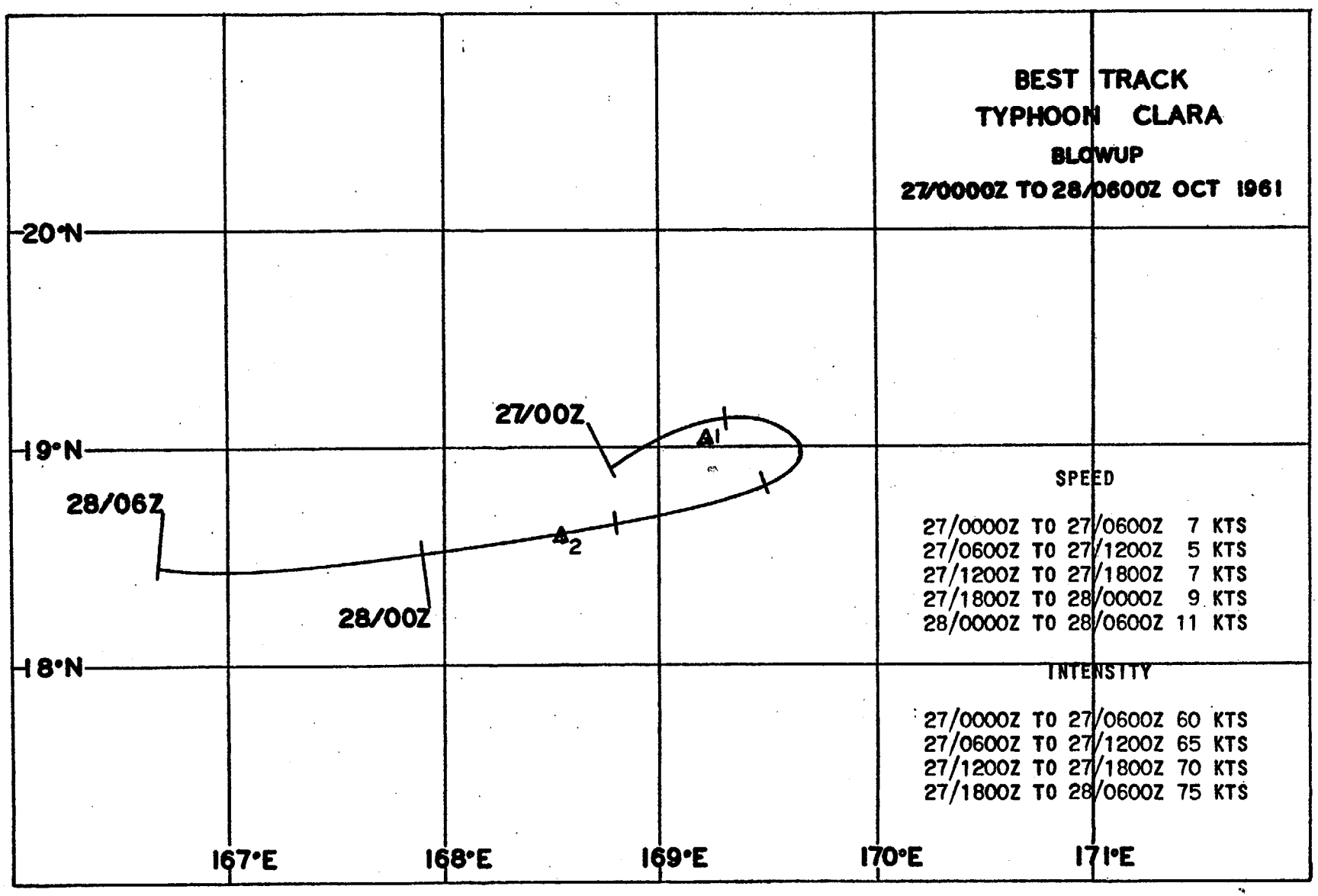
R. TYPHOON CLARA (261200Z OCTOBER - 010600Z NOVEMBER)

THE ORIGIN OF TYPHOON CLARA CAN BE TRACED BACK TO A VORTEX WHICH ORIGINALLY FORMED ALONG THE ITCZ NEAR ENIWETOK ATOLL AND WAS DRIVEN TO THE N BY THE VAST CIRCULATION OF TYPHOON BILLIE. THE FIRST WARNING WAS ISSUED AT 261200Z WHEN SURFACE REPORTS INDICATED THAT THE SYSTEM HAD INTENSIFIED TO TROPICAL STORM STRENGTH AND WAS APPROXIMATELY 100 MI S OF WAKE ISLAND MOVING ENE AT 10 KTS. THIS EASTERLY MOVEMENT WAS PROBABLY CAUSED BY THE COMBINED FORCES OF AN ANTICYCLONE LYING TO THE SW OF CLARA AND AN EXTRATROPICAL CYCLONE SITUATED TO HER NE.

THE ENE MOVEMENT OF CLARA CONTINUED FOR ANOTHER 18 HOURS DURING WHICH TIME SHE INTENSIFIED TO TYPHOON STRENGTH. BETWEEN 270000Z AND 280000Z THE 700 MB LEVEL OVER CLARA UNDERWENT A SIGNIFICANT CHANGE. THE ANTICYCLONE TO THE SW WEAKENED AND QUICKLY DISAPPEARED, WHILE ANOTHER OUTDRAFT WHICH HAD BEEN LOCATED FAR TO THE NW OF CLARA SHIFTED EASTWARD AND REPOSITIONED ITSELF N OF CLARA. BETWEEN 270600Z AND 271200Z CLARA EXECUTED A CLOCKWISE TURN OF 180 DEGREES AND STARTED BACK TOWARDS THE W. SHE RECROSSED HER TRACK AT 280000Z AND PASSED 50 MI S OF WAKE ISLAND AT 280600Z WHILE ON A HEADING OF 270 DEGREES. SHE WEAKENED TO SLIGHTLY LESS THAN TYPHOON STRENGTH AT 281800Z AND STARTED FOLLOWING A LOW AMPLITUDE SINUSOIDAL TRACK TOWARDS THE WNW. CLARA CONTINUED TO GRADUALLY WEAKEN AND DROPPED BELOW TROPICAL STORM INTENSITY WHILE PASSING S OF MARCUS ISLAND AT 301800Z. SHE CONTINUED TO THE W FOR ANOTHER 12 HOURS, THEN STARTED A SWEEPING TURN TO THE N. SHE RAPIDLY BECAME EXTRATROPICAL AFTER ENCOUNTERING THE POLAR FRONT, AND THE FINAL WARNING WAS ISSUED AT 010600Z.

CLARA TRAVELED 1650 MI IN THE 5 DAYS AND 18 HOURS THAT WARNINGS WERE BEING ISSUED. HER MINIMUM SPEED WAS 5 KTS ON 27 OCTOBER AND HER MAXIMUM SPEED WAS 17 KTS ON 31 OCTOBER. SHE WAS ONE OF THREE TYPHOONS THAT LOOPED DURING THE 1961 SEASON, AND THE ONLY ONE TO PERFORM THE MANEUVER IN A CLOCKWISE DIRECTION. DAMAGE REPORTS WERE NOT RECEIVED BY JTWC, HOWEVER POSSIBLE DAMAGE COULD HAVE OCCURRED TO SHIPPING OR SMALL ISLANDS.


BEST TRACK
TYPHOON CLARA
26 OCTOBER–01 NOVEMBER 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
01/06Z
01/00Z
31/00Z
30/00Z
29/00Z
28/06Z
27/00Z
26/12Z
SEE FOLLOWING PAGE FOR BLOWUP
CHICHI JIMA
IWO JIMA
SAIPAN
GUAM
ULITHI
WAKE I
ENIWETOK ATOL
RONGERIK ATOL
TOKYO
K(−10)
L(−11)
M(−12) Y(+12)
172.5°E


BEST TRACK
TYPHOON CLARA
BLOWUP
27/0000Z TO 28/0600Z OCT 1961
20°N
19°N
18°N
27/00Z
28/06Z
28/00Z
A1
A2
SPEED
27/0000Z TO 27/0600Z 7 KTS
27/0600Z TO 27/1200Z 5 KTS
27/1200Z TO 27/1800Z 7 KTS
27/1800Z TO 28/0000Z 9 KTS
28/0000Z TO 28/0600Z 11 KTS
INTENSITY
27/0000Z TO 27/0600Z 60 KTS
27/0600Z TO 27/1200Z 65 KTS
27/1200Z TO 27/1800Z 70 KTS
27/1800Z TO 28/0600Z 75 KTS
167°E
168°E
169°E
170°E
171°E

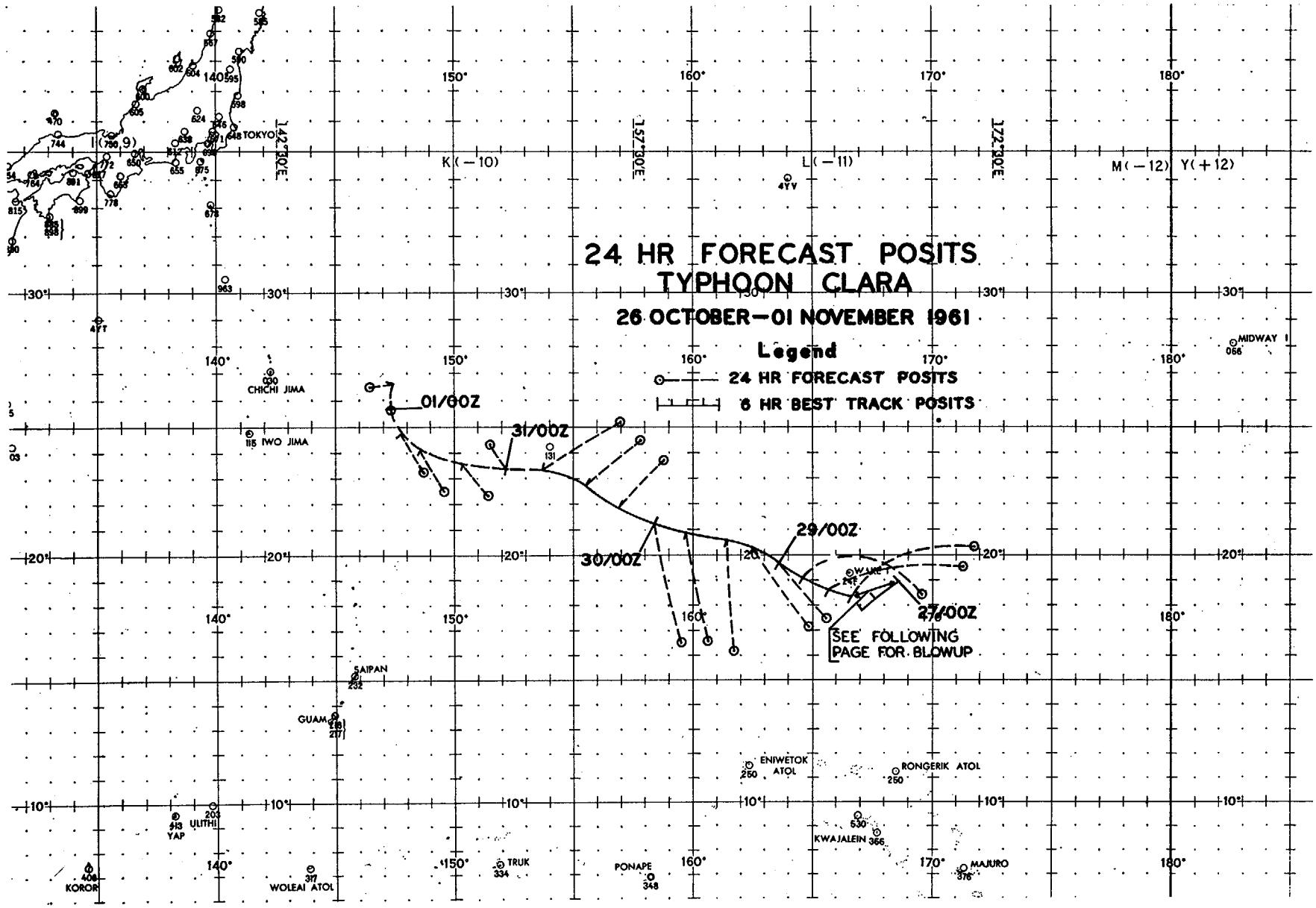
LAND RADAR AND AIRCRAFT FIXES - TYPHOON CLARA

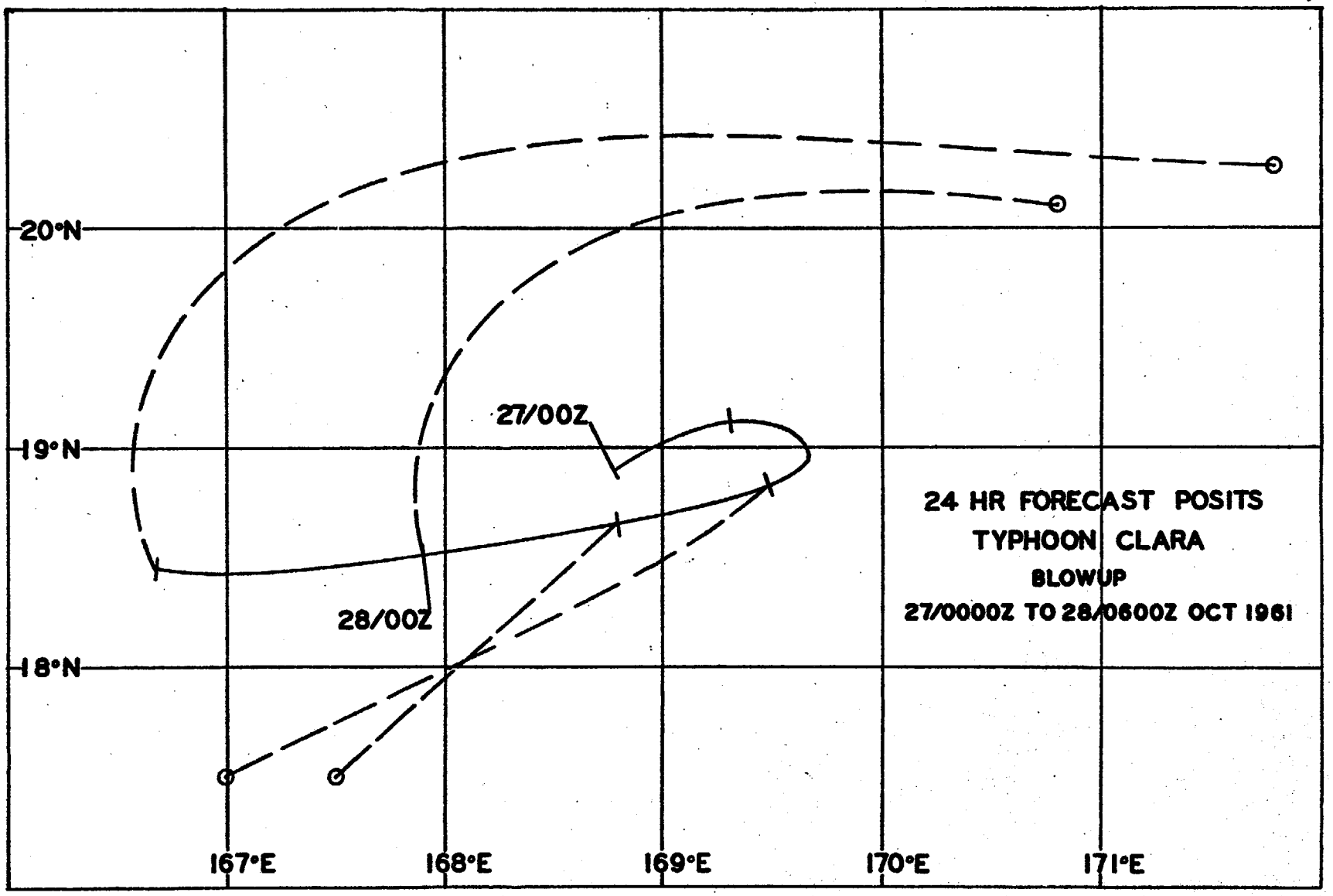
FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
1	270240Z	19.0N	169.2E	VW1-P-U	60	---	-----	---	-----	15 MI DIA OPEN SW & NW
2	271930Z	18.6N	168.6E	VW1-P-05	75	---	-----	984	-----	15 MI DIA OPEN W
3	290230Z	20.1N	163.4E	VW1-P-05	65	---	-----	994	-----	CIRC 15 MI DIA
4	291720Z	21.9N	159.5E	VW1-R-15	---	---	-----	---	-----	----------
5	300039Z	21.1N	158.2E	VW1-P-15	40	---	-----	1003	-----	70 MI DIA OPEN E & N
6	302200Z	23.4N	152.8E	VW1-P-15	30	---	-----	999	-----	20 MI DIA, NO RADAR PRESENTATION
7	310530Z	23.5N	150.5E	VW1-P-U	25	---	10290	---	-----	SCATTERED CB

TYPHOON CLARA 26-OCT-01-NOV 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG. DISTANCE	48 HR. ERROR DEG. DISTANCE
261200Z	17.9N	167.1E	-------	-------
261800Z	18.5N	167.9E	-------	-------
270000Z	18.9N	168.8E	-------	-------
270600Z	19.1N	169.3E	-------	-------
271200Z	18.8N	169.5E	241-165	-------
271800Z	18.7N	168.8E	234-102	-------
280000Z	18.5N	167.9E	062-197	-------
280600Z	18.4N	166.7E	069-317	-------
281200Z	18.6N	165.6E	080-325	082-165
281800Z	19.1N	164.7E	097-282	091-245
290000Z	19.8N	163.8E	141-180	085-585
290600Z	20.4N	162.7E	148-239	083-710
291200Z	20.8N	161.4E	173-284	080-325
291800Z	20.9N	159.9E	171-262	109-201
300000Z	21.3N	158.4E	167-277	156-355
300600Z	22.0N	157.0E	054-147	155-428
301200Z	22.9N	155.6E	054-155	165-492
301800Z	23.4N	153.9E	057-207	159-405
310000Z	23.4N	152.2E	337-63	153-410
310600Z	23.6N	150.3E	148-92	050-367
311200Z	24.0N	148.8E	144-95	052-430
311800Z	24.8N	147.8E	149-112	053-462
010000Z	25.8N	147.3E	222-12	353-65
010600Z	26.8N	147.3E	240-53	189-127

AVERAGE 24 HOUR ERROR 178 MI
AVERAGE 48 HOUR ERROR 361 MI


24 HR FORECAST POSITS
TYPHOON CLARA
26 OCTOBER–01 NOVEMBER 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
01/00Z
31/00Z
30/00Z
29/00Z
27/00Z
SEE FOLLOWING PAGE FOR BLOWUP
TOKYO
CHICHI JIMA
IWO JIMA
SAIPAN
GUAM
YAP
ULITHI
KOROR
WOLEAI ATOL
TRUK
PONAPE
ENIWETOK ATOL
RONGERIK ATOL
KWAJALEIN
MAJURO
WAKE
MIDWAY I
K(−10)
L(−11)
M(−12)
Y(+12)
142.5°E
157.5°E
172.5°E

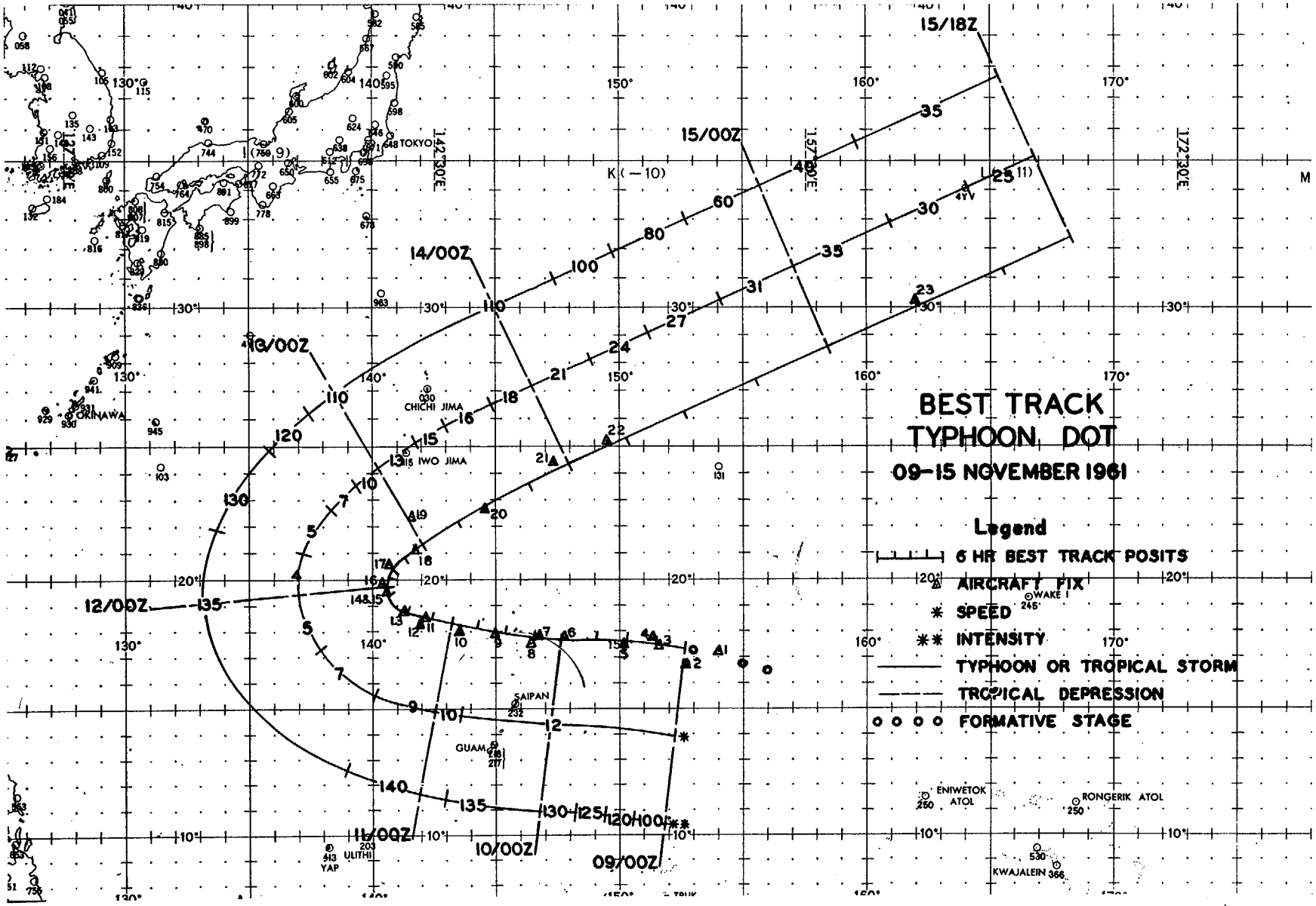

20°N
19°N
18°N
167°E
168°E
169°E
170°E
171°E
27/00Z
28/00Z
24 HR FORECAST POSITS
TYPHOON CLARA
BLOWUP
27/0000Z TO 28/0600Z OCT 1961

S. TYPHOON DOT (090000Z-151800Z NOVEMBER 1961)

On 8 November a series of pilot reports along the Guam-Wake Island track disclosed the existence of an area of severe weather. A subsequent reconnaissance investigation substantiated this and found the source of poor weather to be a fully developed typhoon. The name DOT was assigned and the first warning was issued at 090000Z. It is doubtful that DOT would have been detected even at this advanced stage, had she not formed near a route used by trans-Pacific aircraft. Even at the time the first warning was issued, there was little evidence on any synoptic chart that would support a system of this intensity.

DOT's track for the first two days of her warning life was a nearly straight line towards the W. While she was moving in this direction, the subtropical ridge line started to slope progressively more toward the S. By 110000Z the slope had become quite pronounced, with the ridge axis located 10 degrees N of DOT at the surface and 5 degrees S of her at 200 mb. At this time DOT reached her maximum intensity of 140 kts and started a gradual turn toward the N. She weakened slightly, and at 120000Z showed a sudden increase in curvature, completing a turn of 90 degrees in the next 12 hours. This was apparently caused by a trough passing N of the typhoon and the subsequent southerly movement of the western portion of the ridge line. After this sharp recurvature, DOT continued in another near straight line this time towards the ENE. She followed this track for three days while slowly accelerating. DOT weakened to storm intensity at 141800Z and continued weakening slowly until 151800Z when the final warning was issued.

DOT was characterized by her unusually small size during the formative stages which enabled her to reach typhoon intensity before being detected. Her track of two nearly straight lines meeting at an angle of approximately 150 degrees was also far from normal. She traveled 2425 mi at an average speed of 15 kts during the 6 days and 18 hours of her warning life. The speeds varied from 4 kts on 12 November to 35 kts on 15 November. DOT did not pass over any large land mass while a typhoon. She passed between Pagan and Alamagan Islands at 101000Z causing damage to Alamagan Island that was classed as substantial.


BEST TRACK
TYPHOON DOT
09-15 NOVEMBER 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
15/18Z
15/00Z
14/00Z
13/00Z
12/00Z
11/00Z
10/00Z
09/00Z
TOKYO
CHICHI JIMA
IWO JIMA
OKINAWA
SAIPAN
GUAM
YAP
ULITHI
WAKE I
ENIWETOK ATOL
RONGERIK ATOL
KWAJALEIN

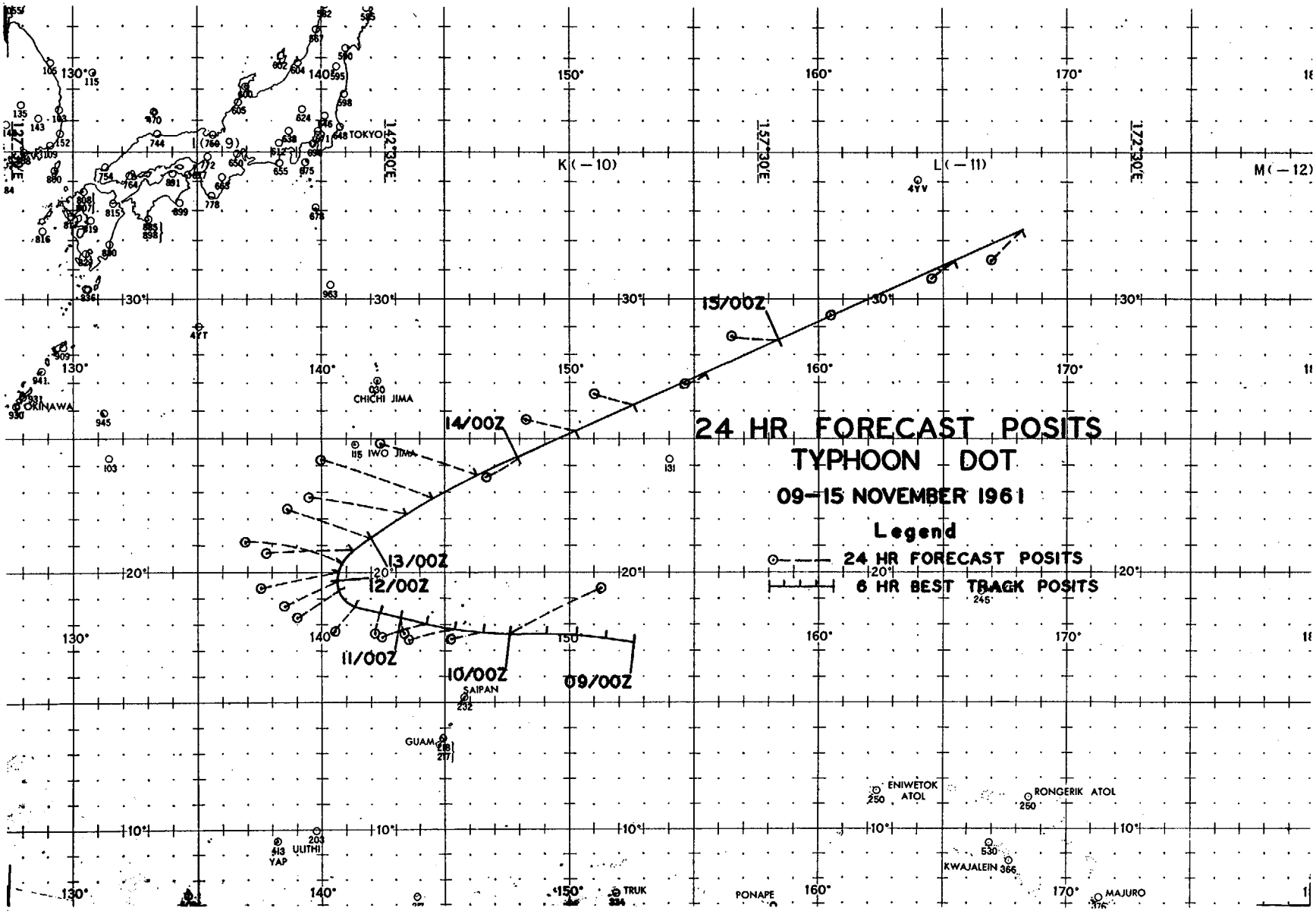
LAND RADAR AND AIRCRAFT FIXES - TYPHOON DOT

FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MAX 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
1	082100Z	17.2N	154.0E	VW1-R-10	---	---	----	---	-----	CIRC 16MI DIA WELL DEVELOPED SPIRAL BANDS ALL QUADS
2	082307Z	16.8N	152.8E	USAF-U-U	---	---	----	---	-----	----------
3	090530Z	17.5N	151.7E	VW1-P-10	125	---	----	982	-----	OVAL 17 X 5MI PERFECT EYE
4	090628Z	17.8N	151.4E	USAF-U-U	---	---	----	---	-----	20MI DIA
5	090810Z	17.6N	150.2E	USAF-R-U	---	---	----	---	-----	20MI DIA
6	100010Z	17.9N	147.9E	VW1-R-03	---	---	----	---	-----	CIRC 19MI DIA
7	100430Z	17.9N	146.9E	VW1-R-02	---	---	----	---	-----	OVAL 19 X 15MI
8	100630Z	17.7N	146.6E	VW1-R-U	---	---	----	---	-----	----------
9	101345Z	17.9N	145.0E	VW1-R-01	---	---	----	---	-----	CIRC 13MI DIA
10	102200Z	18.0N	143.6E	56-P-04	80	117	7960	930	19/13	CIRC 10MI DIA WALL CLDS ALL QUADS
11	110545Z	18.5N	142.1E	VW1-R-05	---	---	----	---	-----	CIRC 22MI DIA, WELL DEFINED
12	110655Z	18.2N	142.0E	56-P-10	100	---	7980	922	16/16	24MI DIA, NOT WELL DEFINED
13	111335Z	18.9N	141.3E	VW1-R-02	---	---	----	---	-----	OVAL NNE-SSW 20X18MI
14	112200Z	19.5N	140.5E	56-P-04	135	100	8270	932	18/15	CIRC 20MI DIA WALL CLDS ALL QUADS
15	120035Z	19.5N	140.5E	VW1-R-02	---	---	----	---	-----	OPEN S SEMICIRC 22MI DIA
16	120400Z	19.9N	140.3E	56-P-04	150	115	8490	931	15/15	CIRC 25MI DIA
17	121400Z	20.6N	140.7E	VW1-R-03	---	---	----	---	-----	CIRC 12MI DIA
18	122200Z	21.2N	141.8E	56-P-02	100	---	8930	958	16/16	NOT DEFINED
19	130445Z	22.3N	142.6E	56-P-05	100	85	9000	960	17/13	NOT DEFINED
20	131200Z	22.8N	144.8E	VW1-R-03	---	---	----	---	-----	CIRC 64MI DIA OPEN E & W

TYPHOON DOT 09-15 NOV 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG. DISTANCE	48 HR. ERROR DEG. DISTANCE
090000Z	17.3N	152.8E	-------	-------
090600Z	17.6N	151.6E	-------	-------
091200Z	17.7N	150.3E	-------	-------
091800Z	17.8N	149.1E	-------	-------
100000Z	17.8N	147.9E	062-210	-------
100600Z	17.8N	146.7E	076-93	-------
101200Z	17.9N	145.5E	079-110	-------
101800Z	18.0N	144.2E	077-105	-------
110000Z	18.2N	143.2E	078-155	058-465
110600Z	18.3N	142.3E	193-41	260-129
111200Z	18.8N	141.4E	221-102	260-165
111800Z	19.3N	140.8E	239-118	264-191
120000Z	19.6N	140.4E	247-112	223-143
120600Z	20.0N	140.4E	259-161	233-206
121200Z	20.4N	140.6E	281-210	267-266
121800Z	20.9N	141.2E	270-183	275-353
130000Z	21.5N	142.0E	287-204	265-396
130600Z	22.2N	143.2E	283-203	272-455
131200Z	22.9N	144.7E	286-261	285-448
131800Z	23.7N	146.3E	290-222	265-501
140000Z	24.5N	148.0E	341-203	294-416
140600Z	25.4N	150.1E	284-110	302-367
141200Z	26.4N	152.6E	291-89	308-395
141800Z	27.4N	155.3E	285-65	313-314
150000Z	28.7N	158.5E	275-102	295-216
150600Z	30.1N	162.2E	248-100	250-190
151200Z	31.3N	165.4E	227-41	280-245
151800Z	32.4N	168.1E	225-103	275-225

AVERAGE 24 HOUR ERROR 138 MI
AVERAGE 48 HOUR ERROR 304 MI


24 HR FORECAST POSITS
TYPHOON DOT
09–15 NOVEMBER 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
15/00Z
14/00Z
13/00Z
12/00Z
11/00Z
10/00Z
09/00Z
TOKYO
CHICHI JIMA
IWO JIMA
ORINAWA
SAIPAN
GUAM
YAP
ULITHI
TRUK
PONAPE
ENIWETOK ATOL
RONGERIK ATOL
KWAJALEIN
MAJURO
142°30'E
157°30'E
172°30'E
K (–10)
L (–11)
M (–12)

T. TYPHOON ELLEN (050600Z-131800Z DECEMBER 1961)

TYPHOON ELLEN'S ORIGIN WAS THE SAME AS THAT OF SEVERAL LATE SEASON CYCLONES WHICH DID NOT DEVELOP TO STORM INTENSITY. IT CAN BE TRACED BACK TO THE VICINITY OF TRUK ISLAND, WHERE THERE WAS SUFFICIENT DATA TO SUPPORT THE EXISTENCE OF A CLOSED CIRCULATION. AS IT MOVED WESTWARD INTO THE "NO DATA" AREA S OF GUAM, ITS PRESENCE COULD ONLY BE SUBSTANTIATED BY PERSISTENCY. MANY SIMILAR CYCLONES HAVE FAILED TO REAPPEAR IN THE YAP-KOROR AREA, BUT THIS WAS NOT THE CASE WITH ELLEN. SHE ARRIVED IN THE WESTERN CAROLINES "ON SCHEDULE" WITH A WELL DEFINED CIRCULATION OF SLIGHT INTENSITY. THE FIRST TROPICAL DEPRESSION WARNING WAS ISSUED AT 050600Z WHEN THE SYSTEM SHOWED SIGNS OF POSSIBLE DEVELOPMENT.

TROPICAL DEPRESSION WARNINGS WERE CONTINUED FOR TWO DAYS WHILE THE SYSTEM BECAME PROGRESSIVELY MORE WELL DEFINED. FINALLY AT 070600Z THE FIRST TROPICAL STORM ELLEN WARNING WAS ISSUED BASED ON A RECONNAISSANCE FIX WHICH REPORTED 45 KT SURFACE WINDS. ELLEN THEN INTENSIFIED RAPIDLY REACHING TYPHOON STRENGTH AT 071200Z AND ATTAINED HER MAXIMUM INTENSITY OF 130 KTS AT 081200Z. SHE HAD BEEN MOVING IN A NEARLY STRAIGHT LINE TOWARD THE WNW UNTIL THIS TIME. SHE PASSED NEAR CATANDUANES ISLAND SHORTLY AFTER 090000Z AND THEN TURNED TOWARDS THE NNE. AFTER THIS TURN, ELLEN'S TRACK BECAME IRREGULAR, SHOWING SEVERAL MINOR HEADING CHANGES WHILE MAINTAINING A CONSTANT 6 KT SPEED OF MOVEMENT. THIS IS CONSIDERED TYPICAL OF A TYPHOON WHICH RECURVES THROUGH THE SUBTROPICAL RIDGE LINE INTO AN AREA OF WEAK ZONAL FLOW. AFTER REINTENSIFYING TO 125 KTS ELLEN STARTED TO WEAKEN, DROPPING BELOW TYPHOON INTENSITY AT 121200Z AND DISSIPATING ENTIRELY SHORTLY AFTER 131800Z.

A TOTAL OF 35 WARNINGS WERE ISSUED COVERING A PERIOD OF 8 DAYS AND 12 HOURS. DURING THIS PERIOD, ELLEN TRAVELED 1400 MI AT AN AVERAGE SPEED OF 7 KTS. HER MAXIMUM SPEED WAS 12 KTS ON 5 DECEMBER AND THE MINIMUM SPEED OF 3 KTS OCCURRED DURING RECURVATURE ON 9 DECEMBER.

ELLEN PASSED WITHIN 10 MI OF THE N TIP OF CATANDUANES ISLAND. THE EYE OF THE TYPHOON WAS 36 MI IN DIAMETER AT THAT TIME, THEREFORE THE COAST GUARD LORAN STATION ON THE ISLAND RECEIVED THE IMPACT OF THE STRONG WINDS ASSOCIATED WITH THE WALL CLOUD TWICE. NEWS RELEASES INDICATED THE PROPERTY DAMAGE TO BE ABOUT $500,000. THE LORAN STATION MADE PREPARATIONS FOR THE PASSAGE ON 7 AND 8 DECEMBER, AND BECAUSE OF THIS, INJURIES TO PERSONNEL WERE MINIMIZED. ONE ENTRY, IN THE LETTER DESCRIBING THE TYPHOON PASSAGE, MADE AT 1800, INDICATES THE FINAL PREPARATIONS PRIOR TO TYPHOON WINDS: "1800, 8 DECEMBER 1961 (N, 33 KTS, 29.58") ALL HANDS MOVED TO SIGNAL-POWER BUILDING. SECURED LOWER STATION EXCEPT FOR POWER (HOT LOCKERS, FUEL AND WATER PUMPS), FRESH WATER, AND FUEL OIL CONNECTIONS. TRUCK PARKED BETWEEN WATER TANKS AND SIGNAL-POWER BUILDING."

A DESCRIPTION OF THE PASSAGE OF THE TYPHOON IS AS FOLLOWS:

A. 2400, 8 DECEMBER 1961 (NE, 45-65 KTS, 29.43") CRACK BETWEEN ROOF JOINT OF SIGNAL ROOM AND POWER ROOM OPENED. LEAKS NECESSITATE MOVING ALL EEE GEAR ON BULKHEAD SHELF OF THE HOT LOCKER TO OTHER SHELVES.

B. 0100, 9 DECEMBER 1961 (N, 45-65 KTS, 29.40") SECURED OUTSIDE TEMPERATURE READINGS DUE TO HIGH WINDS. WATER BEING DRIVEN THROUGH COMMUNICATIONS TRANSMITTING ANTENNA LEAD-IN TERMINAL BOARD AND THROUGH LORAN TRANSMITTER VENT DUCTING INTO THE NORTH END OF BUILDING. ESTABLISHED BUCKET BRIGADE. WATER IS RUNNING ONTO POWER DISTRIBUTION AND SWITCH BOXES BELOW THESE ENTRY POINTS.

C. 0303, 9 DECEMBER 1961 (NNE, 62-85 KTS, 29.22") OBSERVED NO PULSE ON PEDESTAL, USWR AT 10:1 AND TRANSMITTER LINE CURRENT AT 1.9 AMPS. SECURED LORAN TRANSMISSION. REPORTED ANTENNA DOWN. (LATER DISCOVERED THAT ANTENNA WAS NOT DOWN, BUT SEAS HAD WASHED OVER COUPLERS AND SHORTED AND GROUNDED THEM.)

D. 0335, 9 DECEMBER 1961 (UP TO 100 KTS, 29.11") ANEMOMETER IMPELLER GONE. RAIN AND SPRAY DRIVING HORIZONTALLY. NORTH WALL CONTINUES TO LEAK. SIDE DOOR TO SIGNAL ROOM BEGAN POUNDING TO EQUALIZE PRESSURE. ATTEMPTED TO SECURE WITH NAILS AND LINE FROM INSIDE.

E. 0558, 9 DECEMBER 1961 (N, 120 TO 140 KTS EST., 28.80") HOUSEHOLD GENERATOR LOAD VERY ERRATIC. SECURED POWER TO LOWER STATION. (LATER DETERMINED THAT THIS IS TIME WHEN OFFICE BUILDING WAS DESTROYED.) SIDE DOOR CONTINUES TO POUND THOUGH SECURED.

F. 0715, 9 DECEMBER 1961 (N, 120 TO 150 KTS EST., 28.51") LARGE GENERATOR ROOM DOORS BURST OPEN. CLOSED, BARRED, AND NAILED THEM SHUT. ADDED NAILS AND LINE TO SIDE DOOR. STILL SECURE.

G. 0735, 9 DECEMBER 1961 (N, 120 TO 150 KTS EST., 28.17") LIGHT SWITCH IN PASSAGEWAY SHORTED BY WATER FROM ROOF, CAUGHT FIRE AND BURNED ITSELF OUT BEFORE CO2 WAS BROUGHT ON IT. ISOLATED SWITCH AND REPAIRED IT.

H. 0800, 9 DECEMBER 1961 (N, 120 TO 150 KTS EST., 28.15") ALL COMMUNICATIONS ANTENNA DOWN. CONNECTED LORAN RECEIVING ANTENNA TO COMMUNICATIONS RECEIVER. UNABLE TO TRANSMIT.

I. 0915, 9 DECEMBER 1961 (VARIABLE, 30 KTS EST., 28.07") LIGHT WINDS AND RAIN, SKY SLIGHTLY OVERCAST. DISPATCHED TWO TEAMS TO ROUND UP NATIVES WHO DID NOT COME UP TO SIGNAL-POWER BUILDING BEFORE STORM. TEAMS BROUGHT BACK APPROXIMATELY 40 PEOPLE. OBSERVED DAMAGE TO LOWER STATION.

J. 1000, 9 DECEMBER 1961 (LIGHT WINDS, 28.01") LOWEST BAROMETRIC PRESSURE OBSERVED. SEAS ARE BREAKING OVER ENTIRE ANTENNA FIELD.

K. 1130, 9 DECEMBER 1961 (W, 50 TO 70 KTS EST., 28.38") EYE PASSED AND WINDS INCREASED DRIVING RAIN AND SPRAY. OPENED EAST WINDOW TO OBSERVE WAVE ACTION ON ANTENNA FIELD. WAVES ROLLING IN AS FAR AS LORAN RECEIVING HILL. CAN SEE THAT LORAN TRANSMITTING ANTENNA IS STILL UP.

L. 1430, 9 DECEMBER 1961 (W, 130 TO 160 KTS EST.) WIND MUCH STRONGER SECOND HALF. GENERATOR ROOM WEST DOOR BURST OPEN AND TORE OFF. PRESSURE NOW EQUALIZED. DOOR TO GENERATOR EXHAUST HOT ROOM ALSO GONE.

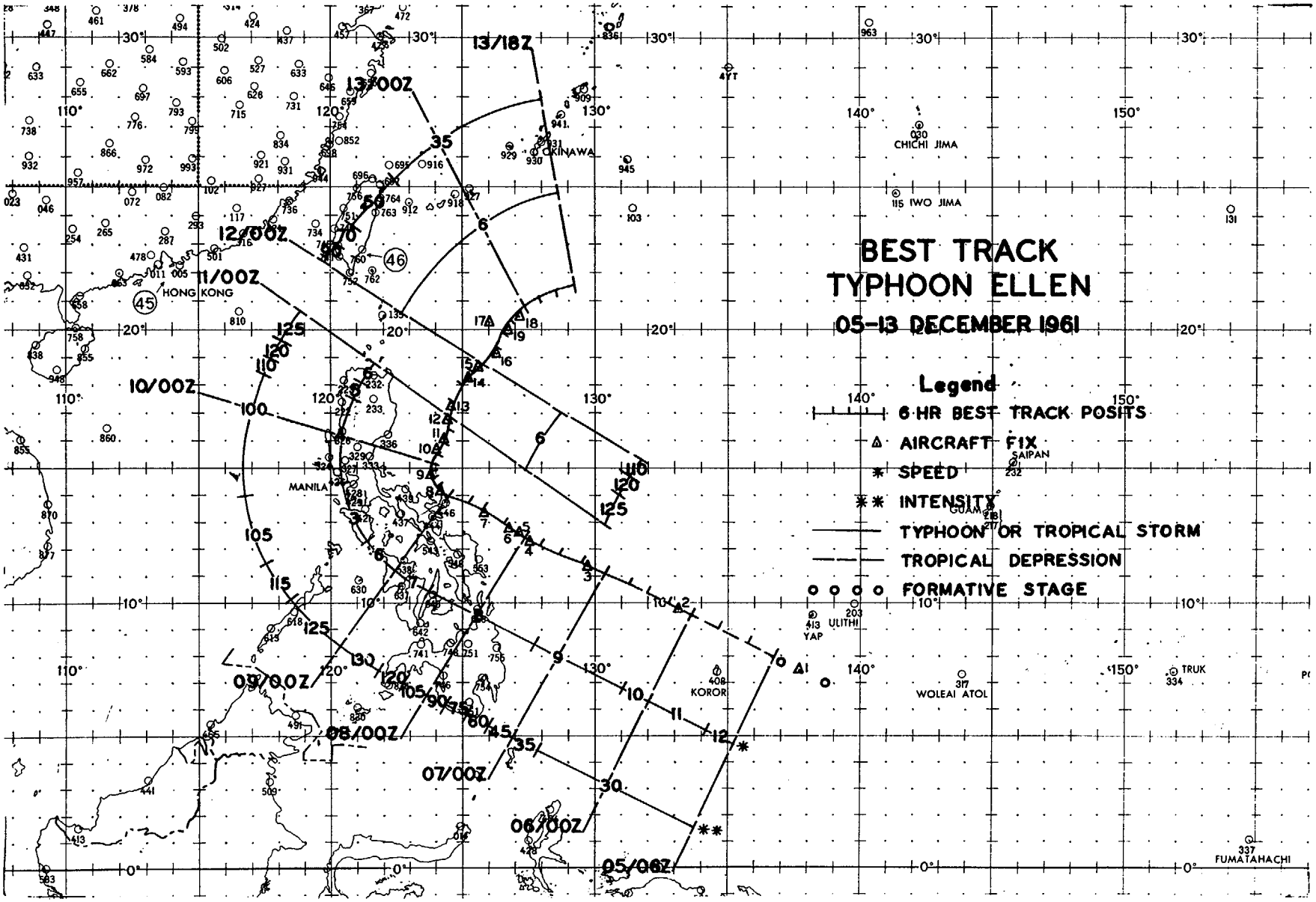
M. 1800, 9 DECEMBER 1961 (W, 30 TO 50 KTS EST., 29.18") BELIEVE TYPHOON PASSED. DUE TO DARKNESS AND GUSTING WINDS, NOT ATTEMPTING OUTSIDE REPAIRS UNTIL DAYBREAK. REMAINING IN SIGNAL-POWER BUILDING OVERNIGHT.

N. 0600, 10 DECEMBER 1961 (W, 8 TO 30 KTS, 29.50") OBSERVED DAMAGE. BEGAN REPAIRING LORAN COUPLERS AND RESTRINGING TRANSMITTING ANTENNAS.

O. 0653, 10 DECEMBER 1961 (W, 10 TO 30 KTS, 29.51") RESUMED COMMUNICATIONS WITH SANGLEY POINT.

P. 1230, 10 DECEMBER 1961 (SW, 10 KTS, 29.62") RESUMED LORAN TRANSMISSIONS.

DAMAGE WAS EXTENSIVE, INCLUDING THE ELECTRICAL, WATER AND SEWAGE SYSTEMS, AND NEARLY ALL BUILDINGS AND VEHICLES. THE DAMAGE WAS DUE TO HIGH WINDS, FLYING OBJECTS, FLOODING AND RAIN. IN MANY CASES SEVERAL FEET OF SAND REMAINED BEHIND TO BE REMOVED LATER.


BEST TRACK
TYPHOON ELLEN
05-13 DECEMBER 1961
Legend
6 HR BEST TRACK POSITS
AIRCRAFT FIX
SPEED
INTENSITY
TYPHOON OR TROPICAL STORM
TROPICAL DEPRESSION
FORMATIVE STAGE
13/18Z
13/00Z
12/00Z
11/00Z
10/00Z
09/00Z
08/00Z
07/00Z
06/00Z
05/06Z
HONG KONG
MANILA
OKINAWA
CHICHI JIMA
IWO JIMA
SAIPAN
GUAM
YAP
ULITHI
WOLEAI ATOL
KOROR
TRUK
FUMATAHACHI

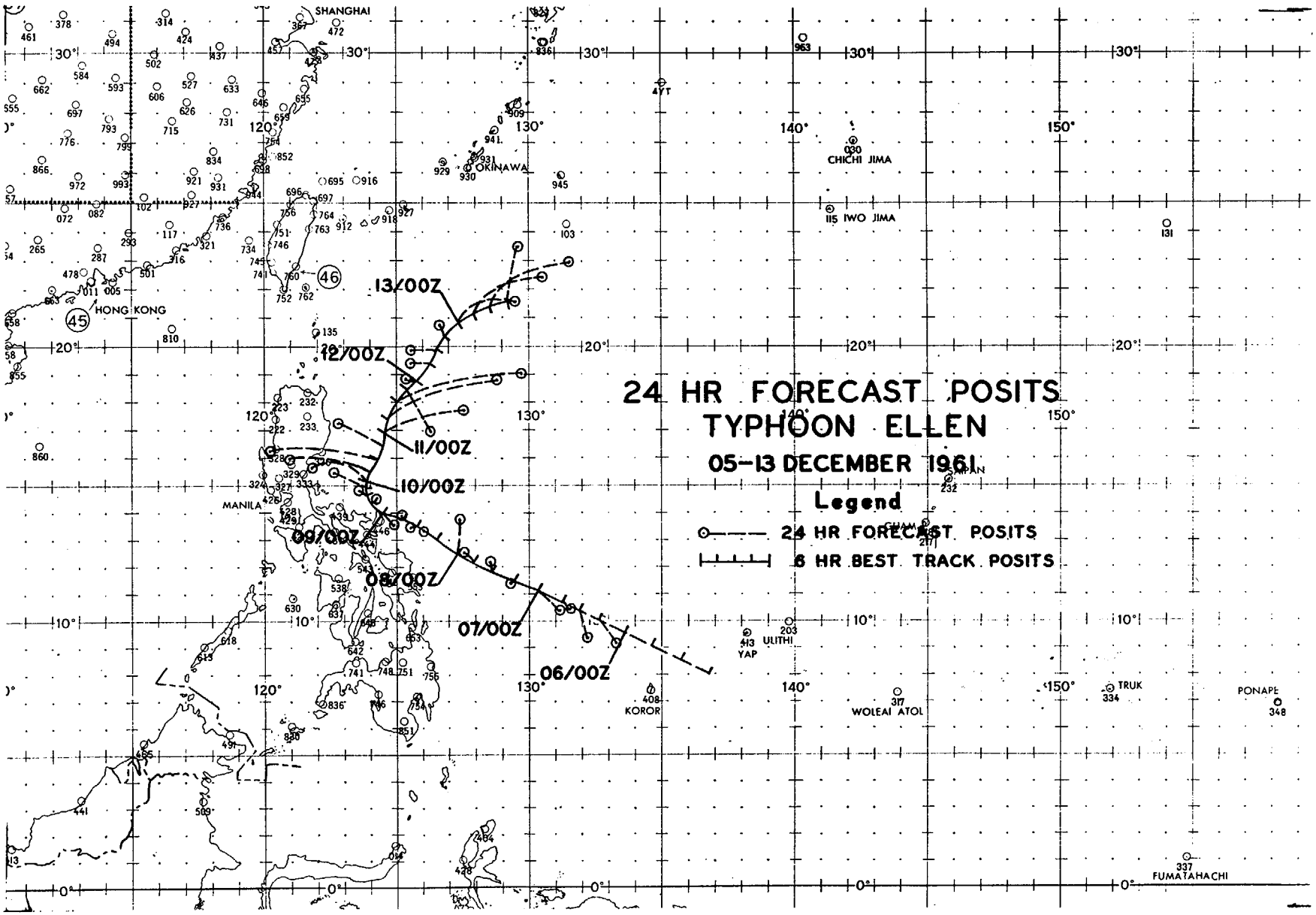
LAND RADAR AND AIRCRAFT - TYPHOON ELLEN

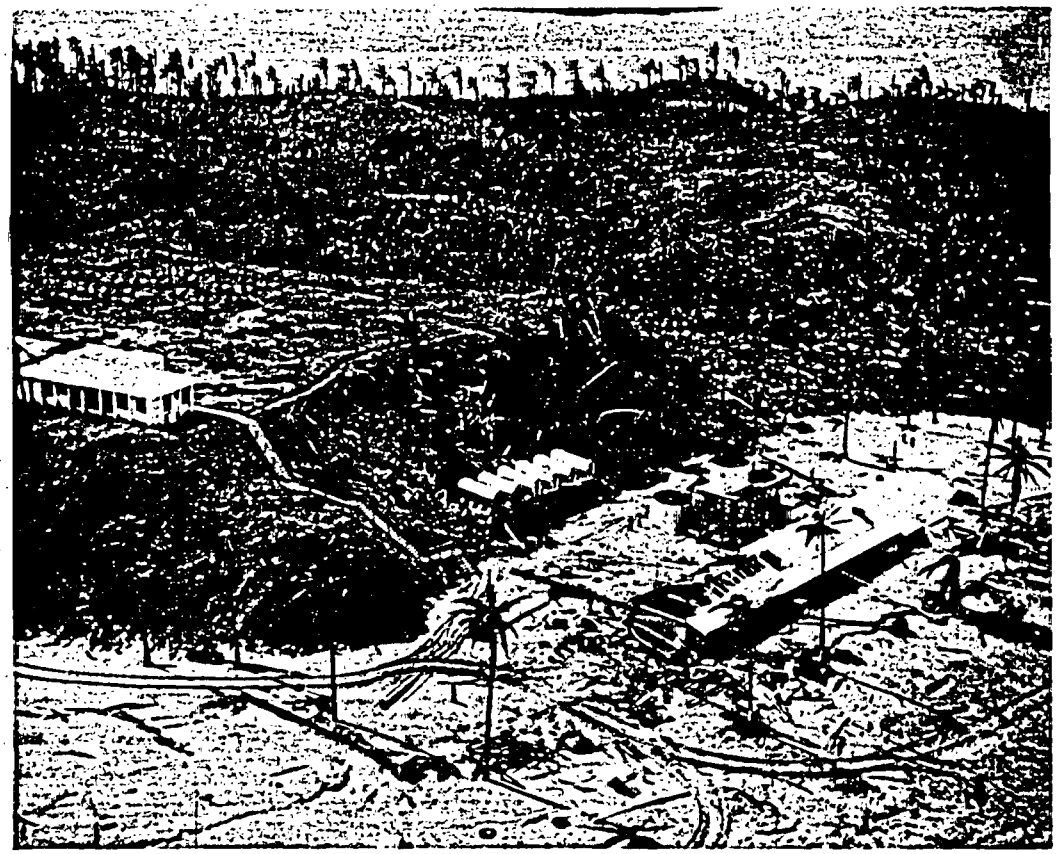
FIX NO.	TIME	LAT.	LONG.	UNIT METHOD & ACCY	MAX SFC WND	MIN 700MB WND	MIN 700MB HGT	MIN SLP MBS	700MB T/TD (°C)	EYE CHARACTERISTICS
1	050100Z	07.5N	137.8E	VW1-P-10	22	---	----	---	-----	80MI DIA WELL DEVELOPED FEEDER BANDS
2	060400Z	09.8N	133.1E	VW1-P-05	30	---	9970	995	12/11	CIRC 15MI DIA POORLY DEFINED
3	070316Z	11.4N	129.9E	VW1-P-05	45	---	9980	988	12/12	CIRC 24MI DIA OPEN N & S
4	072245Z	12.4N	127.5E	56-P-05	100	90	9280	---	19/11	CIRC 25MI DIA
5	080056Z	12.7N	127.1E	VW1-R-05	---	---	----	---	-----	CIRC 23MI DIA
6	080400Z	12.9N	126.8E	56-P-05	100	70	9120	---	19/14	NOT WELL DEFINED
7	081200Z	13.5N	125.9E	VW1-R-02	---	---	----	---	-----	CIRC 33MI DIA WALL CLDS ALL QUADS
8	090300Z	14.2N	124.2E	56-P-02	85	90	8520	945	23/23	CIRC 36MI DIA OPEN SE
9	091445Z	14.7N	123.8E	VW1-R-05	---	---	----	---	-----	CIRC 28MI DIA
10	100120Z	15.7N	124.0E	56-P-03	60	70	8930	956	15/02	CIRC 20MI DIA WELL DEFINED
11	101400Z	16.0N	124.3E	VW1-R-03	---	---	----	---	-----	ELLIP NW-SE 35 X 29 MI
12	102230Z	16.9N	124.5E	56-P-02	150	105	8740	---	19/12	ELLIP E-W 25 X 35 MI
13	110300Z	17.2N	124.6E	56-P-01	150	95	8760	---	19/14	CIRC 40MI DIA
14	111400Z	18.1N	125.2E	VW1-R-01	---	---	----	---	-----	EYE SPLIT INTO HALF SEMICIRCLES N HALF CLOSING, S HALF DSPTG
15	112235Z	18.7N	125.8E	56-P-02	140	90	9390	---	16/09	OPEN W & S ORIENTED E-W 25 X 20 MI
16	120430Z	19.2N	126.3E	56-P-02	175	70	9530	980	13/12	NOT DEFINED ON RADAR, SOFT HAIL IN EYE
17	121330Z	20.2N	126.0E	VW1-R-05	---	---	----	---	-----	10MI DIA OPEN S
18	130200Z	20.4N	127.1E	56-P-02	30	20	10300	1009	12/07	NOT DEFINED
19	131312Z	20.0N	126.8E	VW1-P-05	---	---	10290	---	-----	CENTER 25MI E-W 30MI N-S, NO WALL CLDS

TYPHOON ELLEN 05-13 DEC 1961
POSITION AND FORECAST VERIFICATION DATA

DTG	STORM POSITION LAT.	LONG.	24 HR. ERROR DEG. DISTANCE	48 HR. ERROR DEG. DISTANCE
050600Z	08.0N	136.8E	-------	-------
051200Z	08.5N	135.7E	-------	-------
051800Z	09.0N	134.7E	-------	-------
060000Z	09.5N	133.7E	-------	-------
060600Z	10.0N	132.8E	-------	-------
061200Z	10.4N	132.0E	-------	-------
061800Z	10.8N	131.2E	-------	-------
070000Z	11.2N	130.3E	-------	-------
070600Z	11.6N	129.5E	-------	-------
071200Z	11.9N	128.7E	-------	-------
071800Z	12.2N	128.0E	-------	-------
080000Z	12.6N	127.3E	-------	-------
080600Z	13.0N	126.6E	294-37	-------
081200Z	13.5N	125.9E	270-15	-------
081800Z	13.8N	125.2E	310-11	-------
090000Z	14.0N	124.5E	132-28	-------
090600Z	14.3N	124.0E	030-7	287-33
091200Z	14.6N	123.8E	312-20	299-51
091800Z	14.9N	123.7E	298-74	285-68
100000Z	15.2N	123.8E	286-121	241-81
100600Z	15.6N	124.0E	278-176	268-123
101200Z	15.9N	124.3E	274-241	277-155
101800Z	16.3N	124.5E	302-107	284-247
110000Z	16.9N	124.5E	074-192	267-320
110600Z	17.5N	124.7E	076-246	262-411
111200Z	18.0N	125.1E	077-278	269-444
111800Z	18.4N	125.5E	155-96	002-215
120000Z	18.9N	125.9E	272-42	071-498
120600Z	19.3N	126.3E	267-48	072-546
121200Z	19.9N	126.5E	269-46	072-624
121800Z	20.4N	126.8E	339-24	155-162
130000Z	20.8N	127.3E	070-126	051-81
130600Z	21.1N	127.9E	064-158	052-103
131200Z	21.3N	128.5E	060-198	053-145
131800Z	21.5N	129.1E	017-119	051-153

AVERAGE 24 HOUR ERROR 105 MI
AVERAGE 48 HOUR ERROR 235 MI

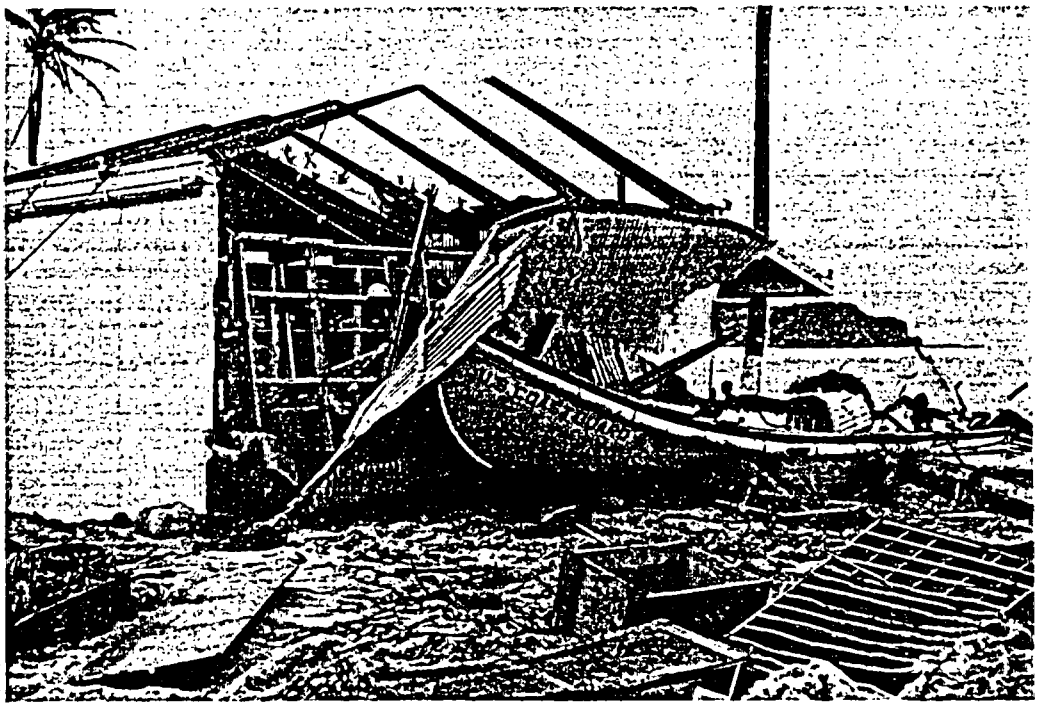

24 HR FORECAST POSITS
TYPHOON ELLEN
05-13 DECEMBER 1961
Legend
24 HR FORECAST POSITS
6 HR BEST TRACK POSITS
13/00Z
12/00Z
11/00Z
10/00Z
09/00Z
08/00Z
07/00Z
06/00Z
SHANGHAI
OKINAWA
CHICHI JIMA
IWO JIMA
HONG KONG
MANILA
YAP
ULITHI
KOROR
WOLEAI ATOL
TRUK
PONAPE
FUMATAHACHI



AERIAL PHOTO SHOWING PART OF DAMAGE CAUSED BY ELLEN TO CGLORSTA, CATANDUANES ISLAND, 9 DECEMBER 1961. (OFFICIAL NAVY PHOTO)

DAMAGE TO LOWER AREA OF CGLORSTA. NOTE DAMAGE TO CONCRETE SLABS. (OFFICIAL NAVY PHOTO)

DAMAGE TO INTERIOR. SAND ON FLOOR WAS BLOWN AND WASHED INTO BUILDING. (OFFICIAL NAVY PHOTO)



DAMAGE TO BUILDING AND BOAT CAUSED BY ELLEN, 9 DECEMBER 1961. (OFFICIAL NAVY PHOTO)